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THE FOUNDRY

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Trade Outlook.

The strike of the anthracite miners has caused more or less trouble at furnaces relying upon this fuel and the attempt to substitute coke has resulted in the production of a considerable tonnage of off-grade iron. In spite of the high prices offered for iron which can be delivered promptly there is but little to be had and as many furnaces are also falling behind in making shipments on existing contracts, the situation confronting the foundries is very embarrassing. Under such circumstances the prices paid show great variation, depending in most cases upon the necessities of the buyer. The coke supply from the West Virginia fields is also being shortened through labor troubles and as many furnaces depend upon this fuel, these will be hampered until other arrangements can be made. Considerable interest is being manifested in the supply of iron for the first half of next year and a number of deals covering that period have been closed.

Our records show that more foundries have been established during the past two months than in any similar period, in fact the first half of the year has added greatly to the foundry capacity of the country. This embraces all branches of the trade, and although the gray iron foundries are way ahead in numbers there are also being built some important works for making malleable iron and steel castings.

Some Features of Stove Manufacturing.

Elsewhere in this issue a correspondent takes up the question of light or thin stove castings and argues that there can be no profit in carrying the paring-down process too far in stove patterns. When the losses in molding exceptionally light patterns, and the increased breakage of such castings in the assembling room and shipping department exceed the value of the metal saved it must be plain that no real economy is effected and that loss instead of profit is to be recorded against such a system. Even after the stove reaches the place where it is to be used defects are liable to develop much more rapidly than if the castings had been made of the proper weight; in short, dissatisfied customers must follow the policy which dictates the use of very light castings. Such being the case it is difficult to perceive where any lasting benefit will accrue to the manufacturer who turns out flimsy and weak stoves for the sake of saving a few pounds of iron. The one who supplies reliable stoves and builds for the future is likely to attain the greatest success.

In his address to the National Stove Manufacturers' Association, at their recent convention in New York City, President Albert N. Parlin, of the Magee Furnace Co., Chelsea, Mass., referred to the elastic character of the country's stove producing capacity and instanced the abnormal demand of 1899, which was readily supplied without causing serious inconvenience, as proof that the manufacturing capacity of this industry is ample for all needs. Mr. Parlin cautioned the stove manufacturers that unless this surplus capacity was intelligently handled, it would under ordinary conditions tend to destroy profits and result in the waste of energy and capital.

One feature of stove manufacture only known to those intimately acquainted with the trade is the expense chargeable to the pattern account and new designs. Mr. Parlin calls attention to the fact that many notable successes in the trade have been achieved by those who have concentrated their efforts upon the manufacture of one article, while the conspicuous failures have been made by those who have over extended their lines in the foundry and pattern shop and sought distant markets for the distribution of their product. He recommended that the members of the Stove Manufacturers' Association consider the question of reducing their pattern accounts as well as their distributive expenses by confining themselves for the greater part to such territory as is contiguous to their respective establishments. In his opinion the expense attached to branch houses and a large corps of travelers necessary to sell stoves in distant markets is not justified by the returns in the long run. Mr. Parlin dwells on the fact that while the demand for cooking and heating apparatus has constantly increased the margin for profit shows a steady decrease. Nowhere are stoves so well made or sold as cheaply as in the United States.

In discussing the advisability of sending representatives to hardware conventions, it seemed to be considered an expensive practice that was inadvisable and unnecessary and one that should be discontinued. The discussion of the use of malleable iron in stove construction was extended, and reflected the opinion that no benefit was derived sufficient to warrant the increased cost.

In considering the establishment of uniform selling prices on different types and grades of stoves it was suggested that the secretaries of the different associations meet to confer for this purpose at some time to be arranged by the national secretary. The discussion on using the names of other stoves, whether as a prefix for trade-mark names or otherwise, was then taken up with a view to remedying a matter that has become serious and to be overcome. It was finally decided that the disadvantage was not of sufficient importance to do any special harm.

In the past efforts have been made to bring the stove manufacturers together in a closer alliance than is possible through a voluntary association. Although the consolidation idea is undoubtedly favored by quite a number of the stove manufacturers, it has thus far failed to inspire enthusiasm or to receive the substantial support necessary to its accomplishment.

A Genuine Fad.

How long will the manufacturers of stoves continue the fad of making stove castings which are entirely too light in weight? Whenever pig iron advances in price there will be found one stove maker or another who, to get ahead of competitors, will resort to making stove castings of unusual thinness. In most cases this reduction of metal is carried to such an extent that it is almost impossible for the molder engaged on this particular class of work to succeed in running these thin castings with the hottest of melted iron.

No doubt some managers when passing through the different departments and glancing at these light stoves will congratulate themselves on saving so much iron, and also avoiding a portion of the freight bill to the customers who purchase them. But there is another side to this question, and the foundry foreman, holding the position he does, has a chance to see this. In the first place, the loss on these very thin stove castings is much greater than on castings of the usual thickness. Besides, the breakage in cleaning and assembling rooms, as also in shipment, makes the loss much greater. These broken castings, as well as the defective work from the foundry, take extra labor to handle and extra coke to remelt. The firm, looking only at these light stoves in the shipping room when tagged and ready to be sent out, does not see or realize this feature of making stove castings of exceptional thinness.

From the molder's standpoint there is the objection to losing a great deal of his labor on this class of work, which he would not do if the patterns were gotten out of the usual thickness. Every few years some firm will come out with a large sized stove that will weigh much less than the general run of stoves, saving, of course, a few cents in freight charges to the dealer who buys this lightweight article. In fact, the manufacturer, or his salesman, rather, is liable to hold up the light weight as an inducement for the dealer to handle these particular lines. I have watched this light stove business for a number of years and find that the fever of resorting to this breaks out among manufacturers at regular intervals, and after a short period it is lost sight of entirely. This is partly due to the reason that making stoves as thin as paper, or there-

about, does not pay the firm who makes them, the dealer who buys them, or the consumer. I remember some years ago that a certain stove foundry got out a set of stove patterns so thin that after they were put to use in the foundry it was almost impossible for the molder with the hottest kind of iron to obtain perfect castings therefrom. After both molder and firm had experienced a great loss, considerable delay and waste of time and material, the firm decided to abandon the attempt of manufacturing these light stoves. It would seem as if the stove manufacturers ought to learn by past experience instead of imagining that money is to be made by paring down patterns to the extreme limit. I am sure that if these people would realize that such attempts always end in failure and that there is a limit to the thinness of stove castings that no such trials would be made. According to my best judgment, the sooner stove manufacturers cease taking up this fad, the better off they will be, looking at things from a financial standpoint.

J. O. LITTLE.

The Proper Temperature at Which to Pour Iron.

The June number of THE FOUNDRY contains an inquiry by the Miller Mfg. Co., regarding the temperature at which molten iron should be poured, to obtain the greatest solidity in castings. In reply thereto I would say that the longer the iron is retained in the ladle to cool, previous to pouring, the fewer shrink-holes will be found in the casting. The disadvantage of molten iron at a low temperature is, that whilst pouring, it will not skim itself of dross in the runner-basin or skim-gate, whichever is used; consequently the casting poured with dull iron will contain fewer shrink-holes, but more impurities than the same casting poured with hot iron. The safest method is to use hot iron (care being taken that it will not cut the mold) and feed casting thoroughly with one or more rods. This will insure a solid casting, and at the same time one free from impurities, the latter being very essential if any machine work is required.

HENRY W. BURY.

Personal.

M. F. Richardson is in charge of the McSherry Mfg. Co.'s foundry at Middletown, O.

C. L. Grimes, formerly of the Wichita Mfg. Co., Wichita, Kansas, has accepted the position of superintendent with the W. W. Whitehead Co., manufacturers of engines and boilers at Davenport, Iowa.

E. C. Wills has resigned the position of foundry manager with the Altoona Foundry & Machine Co., Altoona, Pa., for the purpose of managing the construction and operation of plants by the new Wills process for making steel and malleable castings, under the direction of the Evans & Wills Co., of Philadelphia, Pa.

Burton Scammell has taken charge of the foundry department of the Howard Iron Works, Buffalo, N. Y., resigning his position as assistant foreman with the N. Y. Central R. R. foundry at Frankfort, N. Y.

Arthur B. Stevenson has assumed the management of the Chicago office established by the C. A. Stevenson Pig Iron & Coke Co., at 1209-11 Fisher Building.

Frank S. Barnett has accepted the position of general manager of the McFarland Foundry & Machine Works, of Trenton, N. J., manufacturers of wire drawing machinery, motors for automobiles and marine purposes, etc.

Geo. H. Brown has accepted the position of foreman with the Dickson Car Wheel Co., Houston, Texas.

Robert Dodds succeeds to the foremanship of the Eureka Foundry Co.'s shop at Cincinnati, O.

W. T. Menefee is now foundry foreman for the Parlin & Orendorff Co., Canton, Ill., succeeding W. H. Williams.

John Cato has taken charge of Smith & Loughlin's foundry at Brooklyn, N. Y.

The new foundry of the Union Machine Co., Fitchburg, Mass., will be presided over by Robert Bean.

W. H. Williams has accepted the position of superintendent with the Chicago Malleable Castings Co., West Pullman, Ill.

Jas. Carraher is looking after things at Andrew N. Peterson's foundry, Brooklyn, N. Y.

Wm. S. Limecooley has resigned his position as foundry foreman with the Mount Vernon Car Mfg. Co., Mount Vernon, Ill.

John Condon has taken charge of the foundry of the A. S. Cameron Steam Pump Works, New York City.

The plant of the Bath Mfg. Co., Bath, Pa., has been sold and will be overhauled by the purchasers who will manufacture steam and hot water boilers.

The Falls Foundry Co. have recently been organized to carry on a foundry business at Cuyahoga Falls, Ohio, with a capital stock of $100,000.

The Boston Convention of the A. F. A.

No body of foundrymen were ever better entertained than the members of the trade who attended the seventh annual convention of the American Foundrymen's Association in Boston, June 17, 18 and 19, and the New England founders who looked after the visitors' welfare are to be congratulated upon the completeness with which every detail was planned. Beautiful weather added to the pleasure of the occasion, and a more good-natured crowd could not be found anywhere. A large number of foundries were represented and this time, more than at previous meetings of the association, it was the men of the shop rather than the proprietors of same who came forward to take a hand in the proceedings.

Tuesday Morning Session.

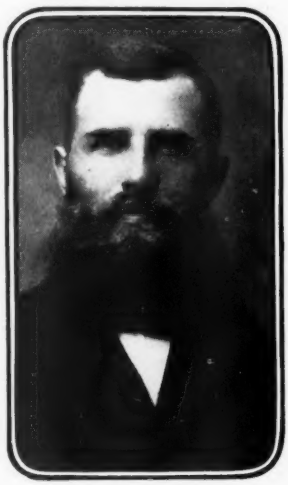
Owing to the death during the year of John G. Sadlier, the president of the association, the convention, which held its business meetings in Huntington Hall of the Massachusetts Institute of Technology, was called to order by the secretary, Richard Moldenke, who introduced Walter F. Prince as chairman. Henry A. Carpenter, president of the New England Foundrymen's Association, extended a hearty welcome to the visitors on behalf of the New England foundrymen and referred to the great value of such meetings in awakening interest in what is being accomplished in the trade. He said that since foundrymen's associations were first organized down to the present time much progress had been made as a direct result of the interchange of ideas and methods at these gatherings, nor are the benefits limited to members of these organizations as all foundrymen profit thereby.

On behalf of Mayor Collins, James H. Doyle, chairman of the Boston Board of Aldermen, extended to the visitors the freedom of the city.

Prof. C. F. Park; representing the Massachusetts Institute of Technology, tendered the association the use of Huntington Hall and invited the members to visit the laboratories of the Institute and inspect the facilities there provided for imparting technical instruction, stating at the same time his belief that scientific education and actual practice must go hand in hand if the best results are to be obtained. On behalf of the association C. S. Bell responded to the various addresses of welcome.

Secretary's Report.

Another prosperous year has been given to us, wherein to consolidate our resources, improve our plants, and plan new developments in our ever increasing industry. The difficulties encountered lay in getting material rather than orders, all foundries abreast of the times making money. As the foundry industry consumed over three and one-half millions of tons of pig iron, besides the proportionate amount of scrap, in the last fiscal year, and iron has averaged at least $15 a ton during that time, there is little wonder that with such enormous sums involved, and these distributed into every nook and corner of this great land, the foundry industry is looked upon as a good barometer of the general business condition of the nation. With indications pointing to a still further advance in pig iron through increased consumption, many of our foundrymen are contracting for next year's delivery, and fortunate are those who have covered their this year's requirements at fair prices.



RICHARD MOLDENKE.

Our association seems to have experienced a similar change to a more prosperous condition, the latter half of the fiscal year just closed, indicating an interest so marked that our members have every reason to be proud of the standing being acquired by it in one of the numerous lines of the industrial development of the world. There is an unusual amount of interest manifested in the study of cast iron, those industries into which large quantities of castings enter making close enquiries about their quality. The molder's art is beginning to be recognized as one which is most intricate and important, and there is a general inclination to place the molder himself upon the plane of a highly skilled workman who should not waste his time and his employer's money by performing unskilled labor.

Perhaps the close economies effected in the steel industry by utilizing the highest skill obtainable, or in other words, by paying for brains well directed, has left an impress on our own methods, for we also are beginning to demand the greatest production at the lowest cost, and are furnishing the best of facilities and paying the best of wages to do it.

There have been many changes in the membership of our association. Death has reaped a harvest, and removed many men most useful to our industry. The sad and tragic death of our worthy president, Mr. John G. Sadlier, was, perhaps, that least expected by us all. Hale and hearty while at our last convention, full of the fire of life while discussing the molder of the future upon the floor of the house; honored by founder and molder alike, he fell by the bullet of one of the very artisans he had helped to make. Appropriate action was taken at the time by our Executive Board, engrossed resolutions expressing the profound sorrow of our members for the man they had honored with the presidency, were conveyed to his bereaved family. The general wave of sympathy, finding its expression even in Europe, showed that his efforts to better the standing of the foundry, as well as uplift the men employed in it, were thoroughly appreciated.

[Secretary Moldenke showed that in spite of deaths, resignations and consolidations, which tend to reduce the association's membership, there had been a net increase of 17 during the year, making a total membership of 314. The association now has members in several foreign countries, and its usefulness being extended to other fields shows the interest which is being taken in American foundry practice. During his recent travels in Europe Dr. Moldenke found nearly everyone anxious to know what is being accomplished in the United States. Ed.]

At the Buda-Pest congress of the International Association for Testing Materials, the study of cast iron was ably urged by the only three American members present, and each of the three is directly interested in a foundry. The result was the making of tests on cast iron a special feature of the work mapped out, and much will doubtless be learned by the associated effort of the many nations interested. Our own American Association for Testing Materials, of which we are members, in its convention last week, devoted one entire session to reports on, and the discussion of, cast iron. The committee appointed by them to codify the matter of specifications will doubtless utilize those adopted by us last year to the best possible advantage.

On looking over the work of the association for the past year, it will be noticed that it was very much in line with progress. The fact that we are nearly all foundrymen, and therefore with interests to conserve, has not prevented us from urging better methods to obtain better results. We are more interested in furnishing our customers with the best of castings than they may be willing to give us credit for, as we have to hold a field which the requirements of the times is making more and more difficult to care for. Our national economy will not long tolerate the production of great weights of inferior cast iron when comparatively light steel castings will do at least as well. The watchword is now to put the best of material into the best made castings, in great quantities and at extremely low costs.

There are two further subjects to which our association might do well to give a substantial encouragement. The study of the electrical properties of cast iron, in conjunction with Purdue University, as reported to you last year, but not acted upon further on account of lack of funds. Then American support is most urgently needed by the Sidero-Chemical Laboratory established in Switzerland, for international research in the very lines which will be of utmost value for the standardization of methods of the laboratory. Should we get into the position that something can be done for these matters a substantial impetus for foundry progress will result in at least those immediate lines.

Treasurer's Report.

The report of Thos. D. West, treasurer, showed that the association is free from debt, due in a great measure to the work of the Standardizing Bureau, the profits of which went into the treasury of the association. Special credit is due Mr. West for the disinterested manner in which he has devoted time and money in the furtherance of a work now everywhere recognized as of great value to the foundry and the steel industries. The income during the year was $2,353.98 and expenses $2,352.61.

Standardizing Bureau.

As chairman of the association's standardizing bureau Mr. West read a report showing that its work is constantly becoming of greater importance and more widely distributed. Not

only are the blast furnaces and laboratories dealing with cast iron utilizing its drillings for their daily standards, but where disputes arise concerning the accuracy of individual work, the association's Standards are sent for to settle them. Thus the purpose for which the Bureau was originally created has been fully accomplished, and the iron industry has acquired a very material help toward a better basis for the daily routine. Through the efforts of a member of the Bureau a substantial reduction in the cost of analytical work has been secured for the trade from two reliable laboratories in Pittsburg and Cleveland.

Standard Methods of Sampling Pig Iron.

The committee appointed at the Buffalo convention to decide upon standard methods of sampling pig iron, composed of Thos. D. West, Richard Moldenke, James Scott, P. W. Gates and E. H. Putnam, reported as follows:

Your committee, after studying the matter, has come to the conclusion that inasmuch as the furnaceman has the burden of the trouble to bear in case of rejections, it is in his interest to see that the various car loads of iron he sells are sampled by the purchaser in the fairest manner possible. Your committee did not think it wise to specify the manner in which a furnaceman should sample his casts, interesting as it may be; for we are solely concerned with the particular car load which comes to us, and have no means of knowing how many furnace casts may be mixed in it accidentally or otherwise. We further recommend that the method to follow be adopted provisionally only, in order to give the furnaces an opportunity to give us the benefit of their experiences during the coming year. Your committee can then report finally.

The specifications accompanying the report are as follows:

1. Eight pigs shall be selected from each car load of iron, two each from the upper and the lower portion of each half of the car. The eight pigs, being of the average size and weight of the shipment, will be fairly representative of the whole.

2. These pigs are broken in such a way that a piece of convenient length showing a clean fracture is available. The eight pieces are placed in a suitable box, and this duly marked with the car initial and number.

3. The freshly fractured and clean face of each piece is now drilled in two places half way between the center and edge, a drill of large diameter being used. From the heap of drillings surrounding the drill enough is taken for the purpose wanted, and placed on a sheet of glazed paper, the drillings being thoroughly mixed and preserved. In case of dirty or excessively sandy iron the magnet should be used on the sample before analysis, for additional safety.

4. Sufficient drillings shall be made to afford material for exchange with the furnace laboratory, as well as with a possible subsequent checking with the American Foundrymen's Association standards.

5. The allowable variation from specified compositions shall be as follows: For silicon, 10 points either way (plus or minus 0.10 per cent). For sulphur not over 0.005 per cent above the determinations, in case of a dispute, to be made by the oxidation method. For manganese, 10 points either way. For phosphorus, not over .05 per cent above for all irons running over .30 per cent. Below this the variation shall be a matter of special agreement. For total carbon, if specified at all, the variation shall be a matter of special agreement.

6. The variation of the check determinations between foundry and furnace, as well as with the American Foundrymen's Association standards, shall not be over the following: Silicon, .05 per cent; manganese, .05 per cent; sulphur, .005 per cent; phosphorus, .02 per cent, and total carbon, .05 per cent.

Standard Methods of Determining the Constituents of Cast Iron.

The same committee also made a report on the above subject showing that letters had been sent to chemists and others requesting memoranda upon their methods, with a view of selecting standards therefrom. Further communications are solicited from active iron chemists in order to have as wide an experience to draw from as possible.

Grading Pig Iron by Analysis.

Messrs. West and Moldenke, composing the committee having this subject in charge, reported that with the exception of the jobbing foundries, other branches of the trade consuming about three-fourths of the foundry iron made, were specifying the composition of the iron purchased by them or else were careful to ascertain the character of the iron being delivered to them. The jobbing foundries, forming the great majority of small isolated plants, had shown but little interest in the subject and continue to purchase their irons by fracture, a

Photo by Kimer Chickering, 21 West St., Boston, Mass.

MEMBERS AND GUESTS OF THE AMERICAN FOUNDRYMEN'S ASSOCIATION AT THE PLANT OF THE WALKER & PRATT MFG. CO., WATERTOWN, MASS.

practice warmly defended by Mr. Bell, who stated that the jobbing founder, who is required to use many grades of iron to meet the wants of numerous customers, was not in a favorable position to buy his iron by analysis.

Foundry Trade School.

This subject elicited considerable discussion. Ex-President Seaman suggested that since the Carnegie Technical Institute of Pittsburg would likely have a department devoted to the foundry trade, arrangements could possibly be made whereby this could be made to fill the wants of the association. On motion of A. W. Slocum, it was decided to appoint a committee of the American Foundrymen's Association to act in conjunction with the Pittsburg Foundrymen's Association in the endeavor to secure the establishment of a foundry department in the Carnegie Technical Institute, which would meet the requirements of the association.

Specifications for Steel Castings.

The following specifications for steel castings as adopted by the American Association for Testing Materials were presented to the convention:

PROCESS OF MANUFACTURE.

1. Steel for castings may be made by the open-hearth, crucible or Bessemer process. Castings to be annealed or unannealed as specified.

CHEMICAL PROPERTIES.—ORDINARY CASTINGS.

2. Ordinary castings, those in which no physical requirements are specified, shall not contain over 0.40 per cent of carbon, nor 0.08 per cent of phosphorus.

TESTED CASTINGS.

3. Castings which are subjected to physical test shall not contain over 0.05 per cent of phosphorus, nor over 0.05 per cent of sulphur.

PHYSICAL PROPERTIES.—TENSILE TESTS.

4. Tested castings shall be of three classes: "Hard," "Medium," and "Soft." The minimum physical qualities required in each class shall be as follows:

	Hard castings.	Medium castings.	Soft castings.
Tensile strength, pounds per square inch.....	85,000	70,000	60,000
Yield point, pounds per square inch	38,250	31,500	27,000
Elongation, per cent in two inches	15	18	22
Contraction of area, per cent	20	25	30

DROP TEST.

5. A test to destruction may be substituted for the tensile test, in the case of small or unimportant castings, by selecting three castings from a lot. This test shall show the material to be ductile and free from injurious defects, and suitable for the purpose intended. A lot shall consist of all castings from the same melt or blow, annealed in the same furnace charge.

PERCUSSIVE TEST.

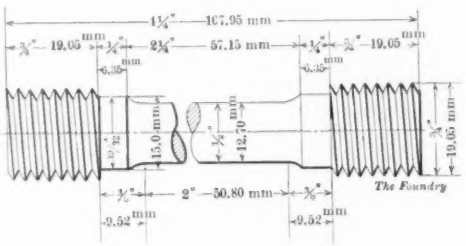
6. Large castings are to be suspended and hammered all over. No cracks, flaws, defects, nor weakness shall appear after such treatment.

BENDING TEST.

7. A specimen one inch by one-half inch (1 inch x ½ inch) shall bend cold around a diameter of one inch (1 inch) without fracture on outside of bent portion, through an angle of 120 degrees for "Soft" castings, and of 90 degrees for "Medium" castings.

TEST PIECES AND METHODS OF TESTING.—TEST SPECIMEN FOR TENSILE TEST.

8. The standard turned test specimen, one-half inch (½ inch) diameter and two-inch (2 inch) gauged length, shall be used to determine the physical properties specified in paragraph No. 4. It is shown in the attached sketch:



STANDARD TEST SPECIMEN.

NUMBER AND LOCATION OF TENSILE SPECIMENS.

9. The number of standard test specimens shall depend upon the character and importance of the castings. A test piece shall be cut cold from a coupon to be molded and cast on some portion of one or more castings from each melt or blow, or from the sink-heads (in case heads of sufficient size are used). The coupon or sink-head must receive the same treatment as the casting or castings, before the specimen is cut out, and before the coupon or sink-head is removed from the casting.

TEST SPECIMEN FOR BENDING.

10. One specimen for bending test one inch by one-half inch (1 inch x ½ inch) shall be cut cold from the coupon or sink-head of the casting or castings as specified in paragraph No. 9. The bending test may be made by pressure or by blows.

YIELD POINT.

11. The yield point specified in paragraph No. 4 shall be determined by the careful observation of the drop of the beam or halt in the gauge of the testing machine.

SAMPLE FOR CHEMICAL ANALYSIS.

12. Turnings from the tensile specimen, drillings from the bending specimen, or drillings from a small test ingot, if preferred by the inspector, shall be used to determine whether or not the steel is within the limits in phosphorus and sulphur specified in paragraphs Nos. 2 and 3.

FINISH.

13. Castings shall be true to pattern, free from blemishes, flaws, or shrinkage cracks. Bearing surfaces shall be solid, and no porosity shall be allowed in position where the resistance and value of the casting for the purpose intended will be seriously affected thereby.

INSPECTION.

14. The inspector representing the purchaser shall have all reasonable facilities afforded to him by the manufacturer to satisfy him that the finished material is furnished in accordance with these specifications. All tests and inspections shall be made at the place of manufacture prior to shipment.

Insuring Patterns.

Frederick Conlin, who presented a paper on this subject at the Buffalo convention, prepared the following paper for the Boston meeting and urged the appointment of a committee from the A. F. A. to meet a representative body of underwriters for the purpose of arriving at an equitable method of appraising patterns:

The question of the insuring of patterns has not received the attention due its importance and there is an urgent need for the adoption of some standard method of adjusting fire losses and establishing trade regulations regarding customers' patterns.

The high rate of premiums charged and in fact the general unwillingness of insurance companies to assume full fire risks on patterns, is owing largely to the difficulty experienced in arriving at a true appraisal of values. This is mainly due to the general absence of complete records of patterns embodying systematic classifications as to service value. It is also a fact that the insurance companies have no clearly defined working basis as to depreciation deductions, etc.

This lack of system can be remedied by bringing the foundry and the insurance interests together. It is practicable to have adopted and brought into general use a "Pattern Clause" to be attached to the insurance policy, making the contract as to pattern risk subject to rules jointly adopted by the Board of Underwriters and the American Foundrymen's Association.

It is also equally feasible to adopt rules and regulations governing important questions concerning pattern insurance which would avoid many troublesome tangles as to the adjustment of fire losses, all to the mutual relief of both assured and insurer.

It is an easy matter to arrive at the cost value of a pattern but the deductions for depreciation is the bone of contention. The service value is the true value of a special tool like a pattern. It is limited to the cost of reproduction.

To arrive at a true basis for the appraisal of pattern values it is necessary to consider: First, a method of classification, under specific headings such as active or current, active and worn, semi-active, repair or emergency, obsolete. Second, a fixed allowance for depreciation deductions to be made either annually or semi-annually and according to changes as to service value as defined by the above classification.

The adoption and use of a general form of book or card system record including classification and valuation would remedy the present erratic and unreliable methods of determining fire losses. In the same way pattern risks would be more readily accepted and possibly at lower rates by eliminating the hazard caused by general lack of record to substantiate claims as to loss of patterns and their service value.

It is entirely within the scope of this association to establish rules and regulations covering this subject. By this means trade customs would be legally construed and the adopted rules regulating the insuring of patterns would become the law and usage of the foundry trade.

Various important questions which are today open to much discussion and doubt could be effectually disposed of. The responsibility of the foundryman to his customer for patterns lost or damaged owing to fire casualty, is a subject not generally understood and for the mutual benefit of both parties, their respective positions should be clearly defined. For instance, the ordinary form of policy insuring the foundryman's patterns does not include the property of others. A policy containing the clause covering "the patterns held by the assured, the property of others for which the assured may be responsible" requires evidence to show that the foundryman entered into a specific agreement to be responsible for the customer's patterns. Otherwise the question of responsibility is one to be left to a jury and according to the common law as to bailments, the foundryman, whether compensated or not, is only responsible when it can be proved that he did not exercise ordinary care in the preservation and protection of the property destroyed and the term "ordinary care" is held by the court to mean that degree of care which an ordinarily prudent man usually exercises in the preservation and protection of his own property.

The conditions surrounding a customer's patterns are different from those owned by the foundryman inasmuch as they should always be considered as active and of value equal to the cost of replacing. They are held by and subject to the control of others and should be covered by a floating policy insuring the patterns wherever they may be. For these reasons, the question of insurance in regard to customers' patterns requires attention as to the best form of policy available so as to enable the customer to secure the most effective protection against loss by fire casualty.

The transfer of patterns via railroad or other common carriers is clearly defined by law in a general way. The compensation paid for the transportation includes also the guarantee to deliver the goods in same condition as received and the common carrier accordingly is supposed to insure the shipment while he is responsible for it. It would be advantageous to clearly define where this responsibility begins and where it ends.

Under the province of trade usage or custom, it is advisable to define if the term "pattern" includes as well, core boxes, follow boards, matches, etc., or any special rig which may be used in connection with a pattern for use in molding from same, of course not including flasks. It is also desirable to define the trade meaning of the terms used for classification of patterns, so as to identify their condition, value, and prospective service as active, repair, obsolete, etc.

The storage of patterns involves the question as to natural hazard. The consideration of the most desirable location and arrangement of structures for the care and protection of patterns is important in many ways, one of which is to lessen the element of fire risk which would tend to reduce both restrictions and rates of premiums as to patterns.

The advisability of insuring patterns under a blanket policy covering them wherever they may be within given boundaries or of fixing a specified amount of insurance on the item of patterns of each building in which it is the practice to store or use them, is also a question worthy of attention.

It is hoped that the value and importance of bringing the subject of pattern insurance into more systematic shape will be recognized by the adoption of a code of rules regulating and defining the various questions involved and by this means a lasting service rendered.

Valuation of Pig Iron.

Secretary Moldenke submitted the following memorial on behalf of a better method of valuing pig iron for foundry purposes than is at present in vogue:

As far back as our memories will carry us, there have been made pig irons of good, indifferent, and poor value, for the making of castings, and with few exceptions they have been sold on practically the same terms. In view of the fact that at the present time every effort is bent upon securing better material for our castings in order to hold the field cast iron is entitled to, it behooves us to devise some standard methods by which a poor iron may either be culled out, or else sold for its intrinsic value only. On the other hand, the makers of pig irons which have suffered least from careless charging, improper mixing of ores with waste products, and other practices better known to the furnaceman, but not tending to good strength in the resulting pig, should be rewarded therefor accordingly.

It is a well known circumstance to all founders that pig irons of the same shape, grade, and presumably the same composition, but coming from different furnaces, when remelted under as nearly the same conditions as possible, will often show entirely different

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WAITING FOR THE CARRIAGES

strengths. Those who have laboratories will know that this is even the case when the composition is approximately identical. For this reason it is somewhat of guess work to predict the strength of a casting from the composition of the irons used, and an element of doubt remains even with the best of mixing and manipulation.

Now that the Standardizing Bureau of our association has made such a splendid record in the course of bettering methods of foundry procedure, why not let it go one step further, and instruct it to devise methods by which we can better judge the value of the pig irons offered us.

As a starting point the following is suggested: The value to us of a pig iron is seen only in its remelted state, therefore to test it we must put it through cupola or furnace, and under conditions which will give it the fairest chance possible. Furthermore the iron should be cast into test bars according to the standards provided for by this association. An analysis of the pig iron and the test bars as well as the physical tests of the latter, can then be made, and we will know that a given iron when remelted and tested has such and such a strength for such and such a composition. We may then choose for our work, condemning the weak irons and selecting those which show promise of fulfilling the conditions required.

Since the furnaceman should have the means of valuing the iron he sells just as much as the foundryman who does the buying, it would be advisable that specifications be drawn up for a standard test cupola, standard methods of melting, pouring, etc., of a stated amount of pig iron. A suitable blank shall be drawn up in which can be filled all the information necessary to properly value the iron.

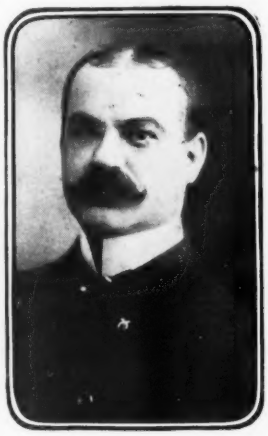
Furthermore, it is suggested that besides furnishing these standard methods to the trade for the individual use of any one who desires to obtain the information, facilities be given the Standardizing Bureau to take this matter in hand themselves for the benefit of those who do not care to go to the trouble of carrying out the process on the exact lines indicated. The Bureau will then be in position to actually make the bars for testing and prepare the samples for analysis. The bars can then be sent for test and the samples for analytical work to the laboratory specified, or in the absence of instructions, be turned over to an approved laboratory. A moderate charge should be made to cover the work done, and to make the undertaking self-sustaining.

Should the plan here outlined prove feasible, the furnaceman who has good iron will find it a much easier matter to induce the prospective purchaser to try it. The foundryman, on the other hand, can buy the iron subject to the standard test, the results he wants of which he can demand guaranteed.

Gradually there will be a series of tests available which will serve to indicate the physical properties of a good iron of a given composition, when remelted, and we will hear less of inferior irons worrying the founder who has to furnish high grade castings.

Tuesday Afternoon and Evening.

No business was transacted by the convention on Tuesday, outside of the morning session. The day was the anniversary of the battle of Bunker Hill and a great military and civic parade during the afternoon interested many of the visitors. The entertainment committee distributed tickets to those who preferred to witness the base ball game between the New York and Boston teams of the National League, while another portion of those attending the convention were piloted around to the many places of historical interest with which Boston and its environs abound.



HENRY A. CARPENTER.

A very complete programme mapping out the proceedings of the convention as well as giving much information in regards to points of interest and foundries in the vicinity of Boston was placed in the hands of the visitors by the committee in charge of entertainment. Tuesday evening nearly every one present enjoyed the performance of the comic opera "The Prince of Pilsen" at the Tremont Theater. Elaborate arrangements were also made to entertain the ladies in various ways.

Wednesday Morning.

Before the convention was called to order Wednesday morning many of the members visited the engineering laboratories of the

Massachusetts Institute of Technology and witnessed tests upon different materials. S. D. Sleeth presided over the business session, which was opened by David Reid reading a paper entitled

Some Methods of Increasing the Production of the Foundry.

Sometimes, a foundry, while equipped with all the modern appliances for turning out work, finds itself unable to live up to its contracts, and the following method of increasing the output was employed in one, which, though not modern in all its equipment, yet competes successfully with those that are, in general light machinery castings. Being part of a large plant for the manufacture of light machinery, there came a time when the other departments were compelled to run night and day, with the natural result that the foundry, already taxed to its limit, was unable to keep up the work for the machine shop. Part of the work was therefore given to another foundry in order to help out. This was most unsatisfactory to every one, except the other foundry, and the manager adopted the same system, with modifications, as the machine shop, namely, two crews of molders, machine operators and laborers.

DAVID REID.

The day crew began work at 5:30 a. m. and worked till 5:30 p. m., with one hour for dinner, receiving twelve hours as compensation, while the night crew started at 5:30 p. m., and did not finish till 12:30 or 1 a. m., getting paid for eight hours. The crews changed positions every week, payments being made every two weeks, their average time being ten hours daily. On Saturdays the men started one-half hour earlier, to avoid Sunday work.

Previous to this arrangement, the men had been receiving three hours extra as a premium for additional work, while the two cupolas, one small remodeled Mackenzie and a large one of the same type, were supposed to be at their limit, giving in two heats twenty-seven tons of a melt daily.

In the writer's opinion, the doubling of this amount of iron melted, which was accomplished and even exceeded at times, is the most creditable part of this method of increasing the production. The small cupola was used in the forenoon, being timed so that the bottom was dropped at 11:45, and bringing down a melt of twelve tons. Five hours later a laborer made it ready for the melter and his assistant, who after eating their supper had this cupola ready for the blast at 9:30 p. m., when a second heat of seventeen tons or over was melted in the one cupola, making a total of twenty-nine to thirty tons every twenty-four hours from a cupola rated by the builders at four tons per hour. The main heat of the day was in the large cupola, which seldom went under twenty-seven tons, this being arranged to get through at 5:30 p. m., there being one section of the shop that worked 10 hours straight.

This system of increasing the production was carried on most successfully for a period of seven months, until business became normal again, and at the end of that time the foundry was nearly three months ahead of the machine shop, which is an exceedingly good thing at a time when labor agitations of various kinds are going on.

As stated before, the cupolas used were of the Mackenzie type and the height from bottom plate to bottom of charging door was only 9 feet. The daily consumption of fire brick used in patching was only eight on an average for the entire period of seven months, when the small cupola was relined to the charging door.

The question of providing cool sand for the molders was taken care of by pouring the front of every floor that was to be used at night, in the first or morning heat, and having laborers take out the castings and wet the sand. When the balance of the work was poured and dumped, that sand was placed to one side, leaving the cold sand ready to be used by the night crew. In regard to the cost per pound of producing castings by this method, though not at liberty to give exact figures, it may be said that it was less than during the six months preceding, when the men were receiving premiums.

Mr. R. P. Cunningham, in his paper on

"Foundry Costs" to be read at this meeting, brings up a point that gives a glimpse at the possibilities for increasing production by the division of labor where it belongs. The steel works and some of the specialty foundries have to a great extent solved this problem, and in the recent conference of the Iron Molders' Union and the Stove Founders' National Defense Association, it was recognized by the molders that the general trend of industrial development is in employing skilled labor, as far as practicable, at skilled work. I predict that in the future every molder, without reference to the class or character of the work, will do nothing but mold, leaving the pouring, the dumping of the molds, the cutting over and mixing of the sand and all other laboring work to unskilled labor.

When we reach the point where the molder starts in the morning to practice the art at which he has served a number of years' apprenticeship, and continues at that work all the time he is being paid for, then and not till then will we have solved the problem of the greatest production at the lowest cost. A number of foundries here represented run jobbing and general machinery foundries, and I venture to say that certainly 95 per cent of their molders stop molding when the blast goes on, whether it gives them six or seven hours of molding time, and as all cannot pour first, the greater part of them are waiting their turn and doing nothing. What matters it if you insist on their staying in the foundry till the whistle blows, do you gain anything by it, except the moral effect it has on the other departments, which of course is no small matter?

It might be asked how the molders will take to such a system, and though they appreciate the efforts in this line in the stove foundries where it is all piece work, yet in the machinery work might it not cause trouble? Having a large number of molders working under this division of labor principle, I can say that they are perfectly satisfied and think it the finest scheme yet devised, as they have no pouring or dumping to do, thus eliminating the hardest and hottest part of what formerly constituted their work.

The only objection that comes from any one is in regard to the pouring crew. But obstacles are encountered only to be overcome by the ambitious, and the men who do the pouring may be only laborers under the direction of a molder, trained for that special work as you would train them for the molding machine. Or if you prefer it, they can be culled from your apprentices with the addition of a molder or two as leading hands, while the majority of your molders keep the cost where it belongs by putting their whole time in at molding and nothing else. The dumping and cutting over of the sand in the foundry where this system is in vogue is accomplished by means of a night crew of laborers, fifteen in number, who take care of the work of one hundred and twenty men, in twelve hours.

That the pouring requires a certain amount of skill is granted, for on that often depends the quality of the work yet in the shop under consideration, laborers, trained, of course, pour off the entire amount of work put up by the molders in a foundry handling nearly twenty-five hundred different patterns weekly, the weight of the castings varying from an ounce to 275 pounds each. The immediate result of this method of increasing production has been the saving of one day's wage all around, as the same amount of castings and more, in fact, is produced in five days, than the same crew of molders formerly did in six days.

Mr. Reid's paper was listened to with considerable interest and at its conclusion the author was asked many questions regarding the operation of the foundry with which he is connected along lines forming a radical departure from established methods in the trade. The information was elicited that during warm weather the pouring crews are increased so that the time they spend at this labor is shortened to avoid exhaustion. In regard to placing the responsibility for lost castings and avoiding friction between the molders and pouring crews, Mr. Reid stated that he had managed to settle affairs of this kind with satisfaction to all concerned.

Hugh McPhee followed with a paper on

Shop Conditions.

Taking the average foundry of the present day and we find conditions existing that are not creditable to either employer or the foreman in charge. A lack of interest, it seems to me, is the cause of this. The molder and apprentice, in my estimation, should not be held responsible for this, for we find that the improvements in all the other departments of great manufacturing concerns result in benefit to both employer and employe. Unfortunately these results are not met with in the foundry. Not that less work should be done, but ways and means should be provided to increase the

IN FRONT OF THE HOTEL BRUNSWICK
PART OF THE TALLYHO PROCESSION
A FEW OF THE SOUVENIRS
AT THE BASE BALL GAME TUESDAY AFTERNOON
CARPENTER & TOMPKINS

efficiency of a shop. This can only be done by a combined effort on the part of the employer and his foreman to make the conditions such that the employe can have a place to work in that will give him heart and interest to do better than he ever did before.

Take the molder who commences at 7 a. m. As he strips for work, he hangs his clothes on a spike driven into the wall as near his floor as may be convenient. Many times these clothes drop to the floor, and no one bothers with them. Then he finds his flasks shook out during the night, but must remove the castings from the sand, wet this down, get his shovel and temper his sand pile so that he can commence to mold. By the time he is ready to begin molding he is played out, but by dint of practice and the necessity of doing so, he labors on with only one outlook before his mind—quitting time.

HUGH MCPHEE.

Now we know that things are usually severe enough to bear even with the best of conditions, for we all have had more or less of just this experience. In the machine and pattern shop we find that the skilled mechanic is not forced to do a laborer's work, and this policy has resulted in benefit to both sides. Why can we not follow the same system in the foundry, which in itself is a less desirable place to work in on account of the dust and dirt. Have a place for each man to hang up his clothes, so that he can dress neatly if he is so inclined. Have his floor ready to begin work on. Let helpers prepare his sand pile so that he can commence molding and not act in the capacity of a laborer the first two hours of the day. Let his castings be shaken out for him, his flasks be fixed up. He can then put in eight hours molding instead of six, and get out superior work and much more of it.

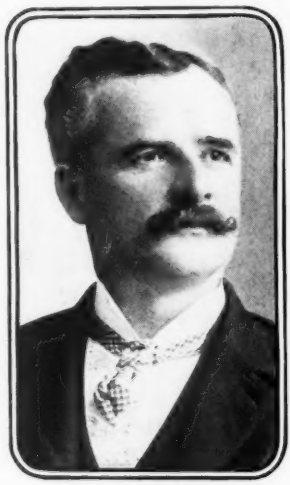
Considerable discussion in regard to the benefits to be derived from providing the molder with improved surroundings and conveniences followed the reading of Mr. McPhee's paper.

Another paper following practically the same lines and dwelling upon the importance of watching details which retard the molder in his work was read by R. P. Cunningham under the title of

Foundry Costs.

Mr. Cunningham tells of the foundry of a prominent concern, whose manager thought that the works throughout were doing as well as could be expected, not knowing that in the foundry the molders and their helpers did not have sufficient small shop tools and depended upon borrowing from one another shovels, riddles and the like. The author suggests that every proprietor or manager spend a part of his time in the foundry in order to familiarize himself with its needs. He continues:

It is the small details which increase the cost of castings. The time when we can get more than a fair day's work from a man has gone by and today every foundryman must keep close watch on his costs and production or he will find the balance on the wrong side of his ledger. In my opinion his only hope is to devise ways to do his work with less skilled labor. This will place him in a more independent position and give him many advantages over his competitor who must rely on skilled labor throughout.



R. P. CUNNINGHAM.

There is one fact that we must not close our eyes to, and that is that the tendency of organized labor is to keep the production down to the lowest possible point, and at the same time increase the minimum rate of wages. Now with these cold facts staring us in the face we must watch very carefully and see that no work is done that we get no returns for. An hour or two extra time spent by the molder on a badly made or worn out pattern

means an increase in cost, and does not increase production, and in order to overcome this we must figure and scheme to have things so that the molder can turn out more work. It is an increase in production without any increase in cost that we must aim for. To do this we must study every pattern, and if we can, by making changes, make a mold any quicker, we should not delay a single day in doing so.

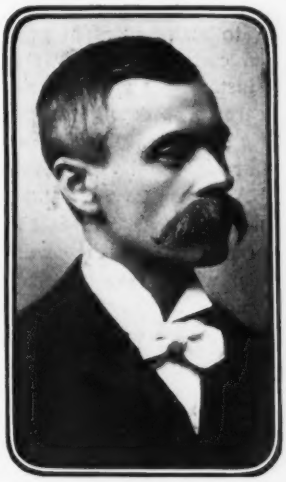
Mr. Cunningham illustrated the saving he had effected in the cost of molding certain castings by paying attention to securing proper patterns and plates. He urged shop owners to give their men credit for improvements and to show their appreciation of such through liberal compensation. The foundry foreman should encourage those under him, particularly the younger element, by consulting with them occasionally and obtaining their views as to how castings may best be molded. Nothing secures the confidence of a young man quicker than to ask his opinion in regard to methods of turning out work.

Edward B. Gilmour presented a paper dealing with cores and core arbors from which we reproduce the following:

Cores and Core Arbors.

After dwelling upon the importance of providing well made cores, properly vented and secured, the author calls attention to the fact that as a general rule first class jobbing molders are also very competent coremakers and says:

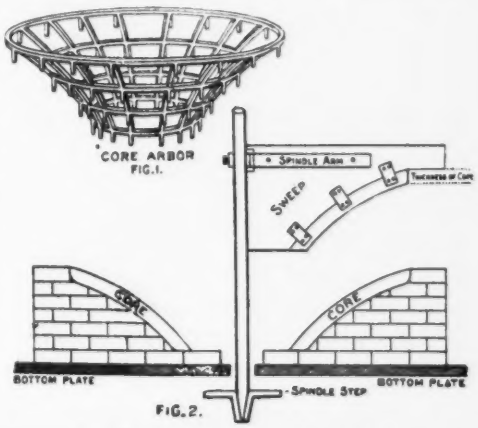
It is usually the practice to make a core-box of the final shape desired, but in many instances guides or templates can be used to great advantage when only one core is required. All cores must have an arbor or rod. These arbors can be made exactly to fit the core in every particular. Take for instance the crown core of a marine cylinder, as represented in Fig. 1. The usual method is to use a portable spindle and a sweep which is made for the bottom part of the core. The thickness of the core is cut out of the sweep and fitted back with strips to hold it in place when the bottom part of the core is swept up. Or, as we might call it, the core box is made as you would build a regular loam mold, Fig. 2. The strips are then taken off and molding sand is rammed into the core-box and swept the shape of the top of the core. Now take a gate-cutter or piece of tinplate, about four inches square, double over into a U shape and use this to cut out the mold to the desired shape, afterwards using a stamp in order to make the mold more regular. Also get a "Dauber" and insert into the mold every four inches apart, and get strong paper, cut it into V shaped strips to cover all over the mold. Fill the center in with sand up to four inches above the top, with the usual gates inserted in order to run it. Level the top of the mold and put a flat plate of the size required on top of it and bolt this to the bottom plate.



EDW. B. GILMOUR.

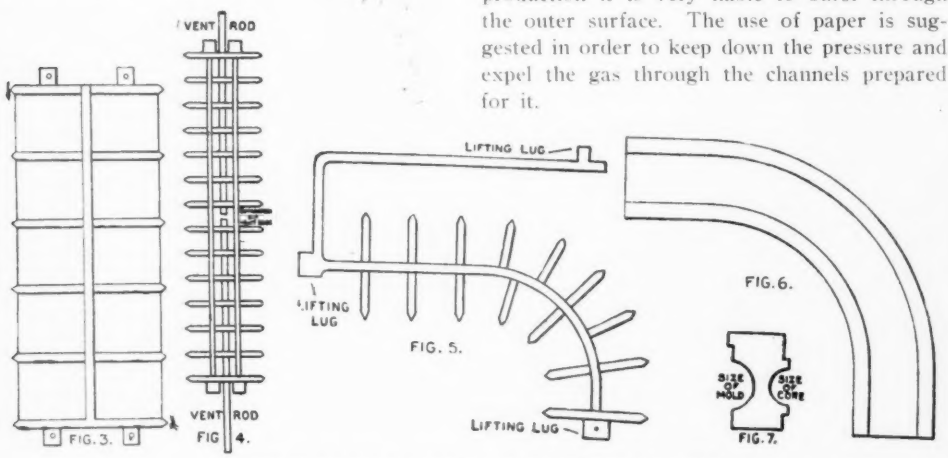
This is a very economical way of making difficult core arbors, as when the casting is made these arbors can be very easily broken and the iron used again as scrap.

The same kind of an arbor can be used in a great variety of work, such as the port cores of marine cylinders, and the cores of locomotive cylinders. I have used them to advantage and with economy, and brought the cost of locomotive cylinder cores twenty-five per cent below the usual method of loose rods, besides having a better and safer core. The method adopted was to make a rough wood template in the shape of the core required, afterwards



SYSTEM OF MAKING CORE ARBORS.

to make a mold the shape of the template, then cut out the arbor corresponding to the strength required, cover the mold with paper and fill over with sand. In making core arbors by this system they can be of any desired shape, no matter how intricate they may be. It is sometimes very desirable to make cores in green sand, especially when castings are very thin, as in a great many instances it would be impossible to get the core taken out before contraction of the casting had taken place. Cores made in green sand are soft and yield readily to the contraction. Another great advantage derived from the use of these cores is that they are very easily removed from the casting and the material from which they are made may be used over again.



EXAMPLES OF CORE ARBORS FOR DIFFERENT CASTINGS.

I at one time had a number of castings to make of the following description: A shell 2 feet by 2 feet 6 inches by 4 feet long and one-half inch thick. It can readily be seen that to use a dried core for a casting of this kind would be folly, as the casting would be cooled and fully contracted before the core could be taken out, therefore the following method was adopted: An arbor was made, as shown in Fig. 3, the end bars were made one inch deeper and were planed perfectly straight so that they rested upon the bottom of the core box. In the flask two bars were bolted the same distance apart as the bars on the arbor, so that when the core was placed in the mold the bars rested upon each other and made a very solid bearing. Holes were put in the lifting lugs in order to bolt the core to the bottom board, which had an iron strap screwed on the full width of the flask with holes to match the ones in the arbor. The object in having the bars planed off was that when the core was placed in the mold it would be perfectly square, as these bars in the flask rested upon the core prints of the pattern and an arbor of this design is so strong that it is impossible for it to twist in any way. If a green sand core should get twisted it is liable to crack, and should a crack occur in a core of this kind the casting would blow up when being cast.

In making a core of this kind it is good practice to put a sheet of newspaper on top of the cinders in order to keep down the pressure of the gases generated while casting. In making a green sand core of these dimensions there is a great pressure of gas inside of it, and unless great care is exercised in its production it is very liable to burst through the outer surface. The use of paper is suggested in order to keep down the pressure and expel the gas through the channels prepared for it.

Upon another occasion I found green sand cores of great advantage. We had to make a large number of columns, having an 8-inch square core running clear through them. These columns were 14 feet long, and we simply made a box grate, Fig. 4. For the vent we had inch rods rammed in the ends of the grate. These rods were put in from each end right through the center of the core as shown, the rods being about 1 inch apart at the center, the object being to allow the gas as it is generated to go freely off. If the rods were connected, the gas as it is generated would travel back and forward until the pressure would become so great that when it was ignited it would explode and would in all probability shatter the core, making a defective casting. By making this core in green sand when the casting was to be cleaned it was simply lifted on end with the crane and struck

A JOLLY BUNCH
THEY STORM THE OFFICE
THE COPPER PINCHES SAM JOHNSTON
ON THE ROAD TO WATERTOWN
ALMOST TOO NICE A LOCATION FOR A FOUNDRY
ON THE LAWN AT WALKER & PRATT'S

a few blows with a sledge hammer when the sand came out and the arbor was saved for the next one. Not only was there a saving in the cleaning of the casting but also in the material used for the core.

In foundries where a large number of pipe connections are to be made, which entail a great expense in pattern making, especially in the majority of instances, where the patterns may never be used again, the principle was adopted of making iron segments 3½ inches wide, the inside being the size of the core. A quantity of all sizes were kept in stock so that whenever pipe was ordered there was always the size on hand that was needed. In order to get the required shape there was made a rough wooden template of the size through the longitudinal section of the pipe. The first operation is to dig a hole in the floor in the shape of the template, the segments and flanges are next put into the hole and the template placed on top. The flanges and segments are arranged to the desired shape, the sand made up to the inside of the segments, which will be as a core box for the pipe when completed. The core arbor is next placed inside of the mold and the green sand core rammed up right inside in its place. Now match the other half segments and flanges on top of the lower half, so as to form the upper half of the core, but put the sand on the outside of the segments so as to form a pattern for the casting thereafter. Make the cope on top and when completed lift off. Then take away the top segments and cut the thickness between the segments. Lift out the core by the three points marked on Fig. 5, cut out between segments in mold and finish as usual.

A core arbor made on this principle requires no anchor or chaplet below the core, but there must be one on top so as to hold the core in its proper place when the pressure is put on in casting. In setting the core arbor into the mold to make the core, it is necessary to put a solid bearing below the three lifting points so that when the core is put back into place there will be no danger in crushing the mold.

The cost of producing special shaped pipes by this method is as cheap as if there was a solid pattern, and there is a great saving of material. There is no limit to the size of pipes which can be made by this method.

Another way which is very convenient for making special pipe connections, which are considered small, is to make a gauge as shown in Fig. 6; also a sweep as in Fig. 7. Make two half cores, and when dried sweep the thickness on each half. In molding lay one half on the follow board, ram up, roll over, and place the other half core on top; make the cope, and when completed take the core out and send back to core room in order to have the two half cores pasted together.

[Mr. Gilmour here describes the method of turning out cores in foundries making a specialty of gas and water pipe, which is well known to our readers. He calls attention to the fact that the number of castings to be made has much to do with selecting the proper method of turning out cores for same. Where the quantity is large a much more expensive rigging is warranted than where only a few are needed from a pattern.]

The question is often asked what size of outlet should be given in venting cores. The best practice is to get it as large as possible, for the larger the outlet the less liability there is of the passages becoming closed. It has been maintained that an opening of one-eighth of an inch is large enough for a cubic foot of core and I have in some instances had a smaller opening, proportional to the size of the core, for a vent passage, but it is not always good practice to have such small passages. When the outlets are very small it is not a good policy to put many cinders into the cores as the more cinders present in a core, the more gas is generated. It is in cases of this description that the designers of castings can materially help to simplify the work in the foundry, and if they were more conversant with foundry practice there would be more sympathy and respect for the molder, on account of the many difficulties he has to overcome.

The kind of material most commonly used in venting cores is cinders. These are the best and the cheapest, and have a tendency to steady the pressure of the gas when generated, and allow it to pass off very easily. The arbors in the cores also make an excellent vent, for when the core is dried the heat in drying expands the rods and causes a continuous space throughout the whole core. In very sharp points in cores it is good practice to simply put plenty of rods without any vent passages whatever as the rods will be sufficient and are more safe.

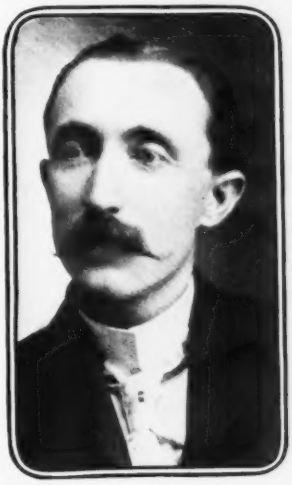
James A. Murphy followed with an illustrated paper on shop tools and rigs.

Shop Tools and Rigs.

Among the greatest economizers in our modern shops are properly designed tools and rigs, and not enough attention is usually paid to this end of the business. I do not mean to speak of such special foundry machinery as is usually procured from foundry supply houses, but those indispensable tools of our own "get up" for lifting and conveying our molds and material and the rigs we use for making our molds in sand and loam.

Aside from first-class management, the design and equipment of a shop is the greatest factor in cheap production. No shop with pretensions to being modern should be without one or more traveling cranes, but these should be supported by a system of auxiliary lifts along the sides of the shop. That traveling cranes are in many places a detriment to cheap production instead of an aid is partly because of this omission, and partly because many places do not know how to work them to the best advantage. It is a patent fact to all close observers that in some shops having the best equipment, molders are kept continually waiting for lifts. Many reasons and excuses can be given, but the principal one is that our own inventive abilities have not kept pace with the times. Our flasks are designed without any thought of quick handling, and our lifting and hitching tools for the most part remain a relic of 30 years ago.

When a journeyman I worked in some large shops where only one set of lifting chains was provided, and when they broke, which was quite frequently, because of ill usage, the greater part of the shop's crew was idle, waiting until they were repaired, which took some time, as in one or two instances the blacksmith's shop was at a considerable distance. That there should be two or more sets of chains of different sizes as well as plenty of hooks, slings, etc., the best managers will admit. Fig. 1 is a style of lifting chain I have in use, which adapts itself to four different lengths and gives admirable satisfaction. Two large links (a) being placed at convenient points to allow for the doubling up and insertion of the hook (b). Fig. 2 is a sketch of the handiest lifting apparatus used in the foundry. Its easy adjustability and quick action are its best recommendations. The sketch shows it hitched on a large cylinder flask (just the opposite from the way it is usually hitched on long flasks). When the flask is lifted off it is set so that the trunnions will rest in the horse at the right of the figure. The cope is then easily turned over by the men and the crane can pass along to further work. This operation when managed properly does not take more than a fraction of a minute.



JAS. A. MURPHY.

The illustration also shows a method of binding which as far as I am aware is a new departure. It does away with the necessity of placing long bolts in bottom and top of flasks, and then screwing them up with binder in position. The cylinder flask shown has no bars, although the bore is 28 inches, but instead an iron grid on top to which are attached wrought iron eyes for the binder to go through. They are also cast in the grate on the bottom. All that it is necessary to do is to push the binder up a little and let it fall into its place in the bottom plate. A few wedges here and there and it is secure. By this means a man will securely bind a large mold in a few minutes. By some other methods in vogue this would take hours.

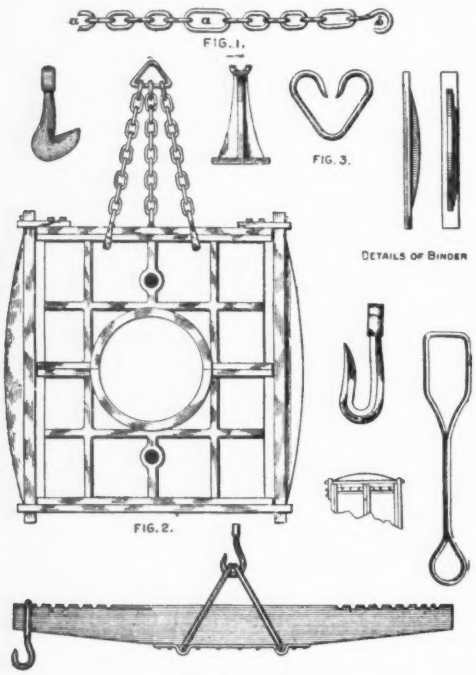
There is another point about the cant-hooks that should not be lost sight of and that is where copes that are only partly rammed up or have cores hanging from them, so as to make a level lift with the chains tedious, they are just the thing, as they will catch equally well anywhere on the flanges. For lifting any castings that have flanges or other projections out of the floor they have no superior. They are perfectly safe and when in use a short time they are considered indispensable.

The shifting or changing hook is a valuable tool, and mostly all shops have some kind of an arrangement. As it is usual when carrying cores, ladles, and miscellaneous loads on the traveler, to first set them down before transferring to another crane, much time is saved by using a proper changing hook. With a hook such as is shown in the sketch Fig. 3, it would be a quick and easy operation to lower

off a load from the traveler to one of the side jib cranes. The hook has the advantage of a small first cost. No welds, easily managed, and thoroughly safe and serviceable.

The method of making flasks and the style of construction is a matter of great importance to most shops. I generally have a frame or outline of the part I want made by the carpenter, and the rest swept in the floor and cast open sand.

I append a sketch of a rather crooked "rig" for making the housing of a large vertical engine which was made in this way. Its general dimensions are about 13 feet long, 4 feet wide,

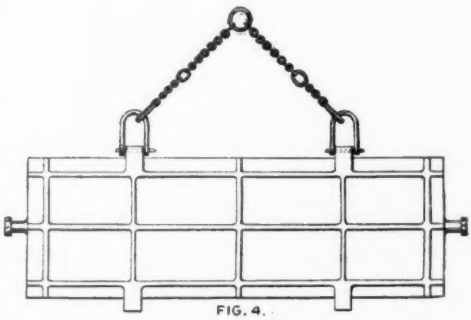


SHOP TOOLS.

and 4 feet deep. Aside from the cost of the metal, bolts and pins it cost me for pattern making $2.50, molding $14.07 and common labor $3.00, or a total cost of $19.57, which certainly is cheap for a flask of its size. The bottom plate was made in two parts so as to come in handy afterwards for core plates as shown in Fig. 4. The flask is shown in Fig. 7.

Speaking of core plates, how many of us are there who have not seen the slipshod manner in which they are constructed in all shops, and how core makers have to put chains around core box and plate to enable them to "roll over." Such a method is not allowable in the best practice except in extreme cases. A plate, the back view of which is shown, accomplishes the purpose of saving the core box, and the rolling over is easier, far quicker, and safer. The box will not slip from the plate if securely clamped as it should be in any case. In some cases I cast in steel trunnions on the end and find they often come in very handy. In others I core out a hole and thread it, so that a trunnion with a standard thread can be screwed in in case of necessity. Many cores are got out of shape by rolling over in the old way besides marring the boxes. Plates should be well ribbed and strong enough to prevent springing. The plate shown is a time saver and has many advantages over those in almost universal use.

The most clumsy tool among foundry lifting devices is the more or less modern I beam, and the cast iron and oak beams will remain



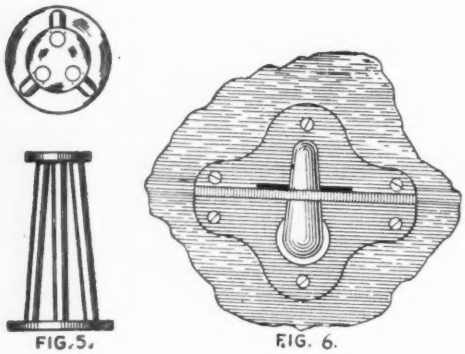
BOTTOM PLATE WHICH MAY BE USED AS A CORE PLATE.

with us for many years to come. For very large work I prefer a well designed cast iron or cast steel beam, while for medium work I have a decided liking for the oak on account of its lightness and general handiness. An oak beam as shown in sketch is a perfectly satisfactory tool in every respect. It will be seen that the beam is not weakened at any point by holes for the clevises, they being bolted to a wrought iron strap running under the beam and forming a perfect rest for it. It is secured to the beam with lag screws. A beam, hook and sling are shown in the illustration.

There are really few flask pins that give satisfaction. The device shown in Fig. 6 I have had in use nearly two years on a set of bench flasks, and so far is perfectly serviceable in every respect. It combines the handle, pin and clamp, or fastening device, by simply pushing in a cut spike when the flask is closed, there

LANIGAN & MUMFORD
HEAR SOMETHING DROP
FITZPATRICK & JOHNSTON
AFTER NAILING AN ORDER
AT WATERTOWN ARSENAL
THE INVITING SPREAD AT WALKER & PRATT'S
HAVING THEIR PICTURES TAKEN

being a shoulder on the pin for this purpose. The device is cast iron. I also employ the same style with slight alterations on all my wooden boxes with very gratifying results. The flask has not to be cut to put them on as they are simply screwed to the side. They are



"HORSE" AND FLASK PIN.

very quickly put on and the molder never has to take his lifter to pick the dirt out of the holes.

The best pusher is he who gets up good "rigs," not for one particular job, but for everything. On many classes of work the foreman must be an engineer of no mean ability, and if he does not know his business, it will tell in construction work quicker than any other branch of the foundry management, excepting, possibly, the mixing and melting of iron.

It is a common thing, in many shops, when a large cope is to be kept above the floor, to pile up the whole place with small wooden boxes, barrels and other truck to support it. A very light and handy set of horses for such purposes should be a part of every shop's equipment. I cannot imagine anything cheaper than the design shown in Fig. 5 as only some old pipe is needed and a cast iron flange run around them on both ends. The clutch hook is also handy on the end of a strong chain for lifting awkward castings. The greatest care should be taken of chains and hooks, and they should be kept safe by occasional annealing. The loss of life which in many cases is akin to murder is due in a great measure to this carelessness. Well designed lifting apparatus is a money maker, and the greatest of diligence should be exerted in keeping it in good and proper order.

S. H. Stupakoff contributed two papers dealing with "Jigs" and "Flasks" as applied to machine molding which will appear in a later issue of THE FOUNDRY as will also the paper by H. E. Diller, describing some experiments made in "Melting Steel With Iron in the Cupola."

Technical Training for Foundry Work.

Prof. Robert H. Richards had prepared a brief paper on the value of a technical training for those who choose a foundry career. Dividing those who enter the foundry business into two classes, those who seek to become expert molders and others who look forward to a managerial career the author speaks as follows for the latter class:

The modern metal works are finding it more and more necessary on account of the greater demands of the consumer, to get the right degree of hardness to suit the tool worker, of strength to satisfy the engineer, and of resistance to chemicals to prolong the life of the finished piece. They can no longer afford to ignore the chemistry of the process where a slight increase or decrease of an element may make or mar the result, nor can they

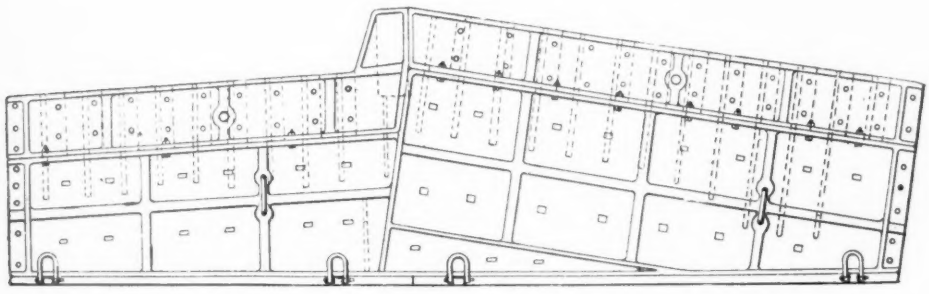


FIG. 7

FLASK FOR ENGINE HOUSING.

afford to ignore metallography which by etched surfaces studies the arrangement of the crystals of the several compounds which go to make up the mass of the casting, and which by their size and arrangement indicate the favorable or unfavorable condition of the metal; nor yet can they ignore the pyrometric measurements by which they can follow the heats through the time of treatment and note the conditions which give more favorable or less favorable results.

The grammar school boy who has passed through the apprentice period has not had the training necessary for intelligently discussing questions of composition, structure, or chemcial stability of the metals. The technically educated, while he may not have dealt with the exact questions that come up in foundry practice, has dealt with questions quite as complex, and his school training has largely been in the direction of developing in him breadth of view and quickness of perception, mental alertness and adaptability so important in keeping abreast of the modern march of improvement. It is to say a good word for these men and to ask for them a trial that this paper is written, and it is the belief of the writer that not the young man only will be the gainer, but that the works which get the right man with technical training will find great advantage therefrom.

Business men will always need to have patience with the school trained man while he gets his special practical experience, just as they do with the apprentice who makes his blunders which have to be submitted to while he is learning. The school man's blunders will teach him something, while the apprentice may get no wisdom. In this time of many books, the school man has an immense advantage in familiarity with the literature of the subject, thus saving time in finding out what others have done, and saving time in not repeating the disastrous experiments of others. He is also able to find suggestions for new work in this literature which may be as sounding words to the uneducated man. In the iron and steel business, the school educated man has come to the front. Why should he not also in the foundry business?

Wednesday Afternoon.

One of the pleasantest features of the convention was the carriage drive through the Metropolitan Park system to the modern plant of the Walker & Pratt Mfg. Co., at Watertown, Mass., stopping en route at the U. S. Arsenal, also located in Watertown. The majority of the visitors availed themselves of the privilege to pass through a government foundry and machine shops and found in these many objects of more than ordinary interest. But a short time was spent here when the party proceeded to the Walker & Pratt establishment, the surroundings of which, by the way, do not bear the earmarks of a factory location. Like the National Cash Register Co., of Dayton, Ohio, the Walker & Pratt management seem to believe that the modern workshop can be made none too comfortable for the workmen who must spend their time therein. Much has been done to inculcate cleanliness among the men and the lavatory contains one hundred separate bathing rooms, so that there can be no excuse for anyone leaving the premises with the factory dirt clinging to him. In addition to being one of the neatest and cleanest foundries in existence much of the hard work ordinarily devolving upon the stove plate molder is here absent. It has been contended that in the manufacture of light castings it was necessary that the molder should catch his iron at the cupola spout in order to run the castings, yet at the Walker & Pratt stove foundry all the iron is distributed to the molders by trolley tracks and no difficulty is found through the iron not being hot enough to suit the light castings there made. It may be said that a system of pouring the floors off in sections is followed, by which the hand ladles of the molders are prevented from cooling off as is the case where all the molders of a shop pour off at the same time and take their turns at the cupola.

The visitors were handed a diagram of the plant, which contained information in regard to the size of the different departments and also showing the route to be taken through the works in order that everything of interest could be seen, the length of this being half a mile. Neat attendants, ready to answer questions, were also posted throughout the works and altogether it was a most interesting visit to this modern foundry. After passing through the plant an elaborate lunch was served in a tent on the lawn when the return trip to Boston was made through Cambridge and the Harvard College grounds.

In the evening the ladies attending the convention were especially entertained in the parlors of the Hotel Brunswick, while the men

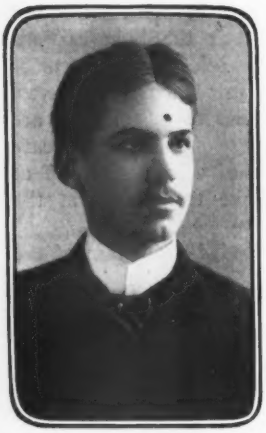
were tendered a vaudeville entertainment and smoker at Copley Hall, one of the most pleasant gatherings which has ever been connected with a foundrymen's meeting.

Thursday's Proceedings.

Almost the entire day was devoted to a boat trip around the harbor of Boston on the steamer "Myles Standish" and a visit to Nantasket Beach, where a shore dinner was served. The Salem Cadet band furnished music for the occasion.

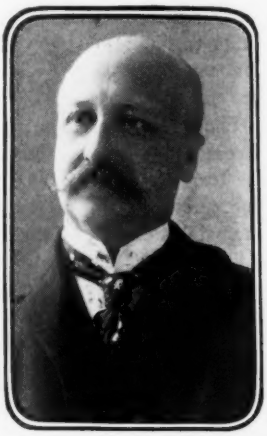
FRED F. STOCKWELL.

The closing session of the convention was held on Thursday evening, T. J. Best presiding. The first matter taken up was the election of officers for the ensuing year. The nomination of candidates for the presidency was first called for and the name of Arthur W. Walker, president of the Walker & Pratt Mfg. Co., Watertown, Mass., was the only candidate offered. He was elected by acclamation. The nominating committee consisting of William Yagle, C. J. Wolff, J. P. Golden, Stanley G. Flagg, Jr., and Theo. Colvin, Jr., then reported the remainder of the names selected for the various offices and all were elected without a dissenting vote. Dr. Richard Moldenke was continued as secretary, while Thos. D. West at his own request was replaced as treasurer by Willis Brown, of Erie, Pa. The district vice presidents selected are as follows:



JOHN MAGEE.

First district, New England States, J. F. Lanigan, Davis Foundry Co., Lawrence, Mass. Second district, New York and New Jersey, J. A. Beckett, Hoosick Falls, N. Y. Third district, Pennsylvania, Delaware, Maryland and District of Columbia, F. H. Zimmers, Union Foundry & Machine Co., Pittsburg, Pa. Fourth district, Michigan, Ohio, Kentucky and Tennessee, A. I. Findley, Editor *Iron Trade Review*, Cleveland, Ohio. Fifth district, Indiana, Illinois, Missouri, Kansas, Colorado, New Mexico, Utah, Arizona, Nevada and California, C. J. Wolff, L. Wolff Mfg. Co., Chicago. Sixth district, Wisconsin, Minnesota, Iowa, North Dakota, South Dakota, Idaho, Nebraska, Montana, Wyoming, Washington and Oregon, Adam W. Bair, Milwaukee, Wis. Seventh district, Southern States, J. P. Golden, Golden's Foundry & Machine Co., Columbus, Ga. Eighth district, Canada, T. J. Best, Montreal.



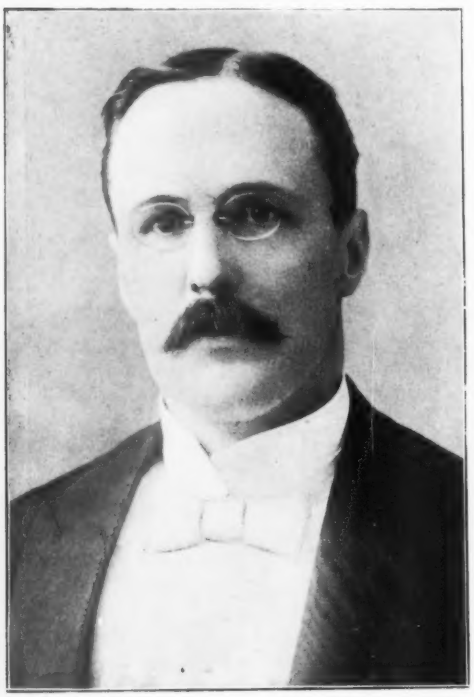
EDGAR W. ANTHONY.

Resolutions of thanks were adopted to the New England foundrymen for their bounteous hospitality, to those who had prepared papers, to the Walker & Pratt Mfg. Co., and to the Institute of Technology. The question of a meeting place for next year's convention was then taken up. Secretary Moldenke stated that he had received a number of invitations from the Foundrymen's Association at Milwaukee, Wis., who are very anxious to have the convention in 1903, and St. Louis is after the convention for the following year. Cleveland will also receive some consideration for the meeting of next year, the matter having been referred to the executive committee for settlement.

BARTLETT M. SHAW.

A HEALTHY LOOKING LOT OF FOUNDRYMEN
THE PROCESSION HALTS FOR A REST
OUT FOR A GOOD TIME
IN THE BOSTON COMMON
SPECIAL CAR
BOARDING THE SPECIAL CARS FOR ROWE'S WHARF

A. M. Loudon on behalf of the Associated Foundry Foremen, an organization formed to advance the interests of those having charge of shops, addressed the convention in favor of a plan whereby the latter might affiliate with the American Foundrymen's Association. The executive committee were authorized to confer with a committee from the foremen's organization and given power to act.



ARTHUR W. WALKER.

R. F. Flinterman, of Chicago, introduced a resolution providing for the organization of a chemical section of the American Foundrymen's Association. This section is to be composed of all those foundrymen and chemists who are interested in the chemical and metallurgical studies relating to the foundry. It was decided that such an organization should be formed and Mr. Flinterman was appointed chairman of a committee, he to select his two assistants, for the purpose of outlining the scope of the section.

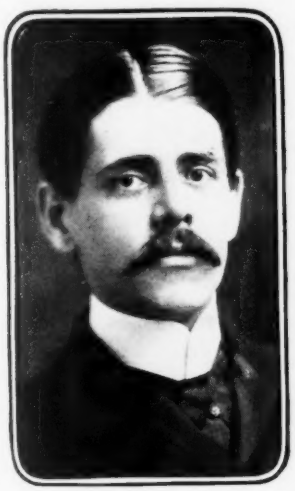
A. W. Slocum addressed the chair, stating that he had been requested to reply to those who were in the habit of asserting that foundry practice had made no progress in the last 40 or 50 years. He proceeded to take up a number of details of the foundry business to show that great progress had been made. He asserted that if any one should say that brass castings were made 30 or 40 years ago as well as they now are it would be taken as a joke and not seriously. A glowing tribute was paid to the progressiveness of pipe founders. The requirements as to car wheels had been increased 250 per cent, which, of course, meant better methods for producing them. In radiators the modern product is of one-half the weight at one-fourth the price and is more artistic. Even in general jobbing work any foundryman who had been in business 50 years who would admit he had made no progress in that time would thus acknowledge his unfitness to act even as a foreman. W. W. Lobdell arose to support the statement made by Mr. Slocum, saying that no man connected with the foundry trade could hardly be so foolish as to assert that no progress had been made in this branch of trade in the past 30 or 40 years. He also gave examples to show what had been done in some branches of the foundry business and particularly in introducing better methods of casting chilled rolls. As the discussion of this subject bid fair to consume considerable time, a resolution was offered by Thomas D. West, which was adopted, to the effect that foundry practice has made great progress in the last 30 years, and that any one who states that no progress has been made does not voice the opinion of this association.

Herbert E. Field presented a paper entitled

The Metallurgy of the Cupola.

The quality of cast iron depends, to a great extent, upon cupola practice. The best of pig iron can be changed into inferior cast iron by poor melting; while an inferior pig may, by judicious melting and mixing, be used in high grade castings. There are hardly two cupolas in existence which work under exactly the same conditions, with the same sized tuyeres, the same amount of blast, with equal height of tuyeres from cupola bottom, etc. For every variation in cupola arrangement, there is a variation of the effect in melting iron. The greater the difference in the cupolas, the greater will be the variation in the melted product. Pig iron and coke merchants frequently find that two firms engaged in exactly the same line of work and using the same iron and coke, get very different results. Let us take as an example an experience which the managers of a certain foundry had with coke. They had used for a number of years a standard brand of Connellsville coke, and their

cupola had been so arranged as to give the best results with this coke. The agents for another grade of coke, of a much lighter nature, finally persuaded them to try a car of their coke. After carefully ascertaining that a neighboring foundry was having excellent success with the lighter coke, they bought a carload. The first day it was used the trouble began and continued to such an extent that no more of that coke would be taken as a gift, and the last of the car was worked up, mixed with one-half Lehigh broken coal. Upon inquiry, the cause of the differing results obtained by them and by the neighboring foundry, which was using the same light weight coke with such excellent results, was found to be this: In their own cupola the distance from the tuyeres to the sand bottom was but eleven inches, while in the cupola in which the lighter coke was being used so successfully, the distance was twenty inches. The tuyere area in the former was but one-half that of the latter, while the pressure in the former was greater by four ounces. This needs no explanation to one familiar with cupola practice.



HERBERT E. FIELD.

Turning from coke to iron we find that the percentage of loss or gain of the metalloids or impurities varies with the height of tuyeres, size of bed, melting ratio, the size of the tuyeres, pressure of blast, amount of flux, and the method of fluxing. When pig iron, in the course of melting, comes in contact with the blast, and is acted upon by it, certain of the metalloids are burned out of the iron. This is true in all cupolas. The amount burned out increases with the amount of air forced into the cupola by the blower. In the same cupola, and under the same conditions, irons varying in composition will lose different amounts of impurities. As the melted iron, freed to a certain extent from some of the metalloids, passes through the incandescent bed of coke or coal, it absorbs new impurities from the bed. The amount absorbed varies with the cupola practice. From a heavy or deep bed, other conditions being equal, more impurities will be absorbed than from a light or shallow bed. The temperature of the iron at this time has a decided effect upon the amount of metalloids thus taken up by the iron, as does also the amount of flux used. With a hot running cupola and a large amount of flux, little sulphur will be absorbed by the iron, while a large amount will come off with the slag.

There has been much discussion in the last year or two as to whether certain of the metalloids lose or gain in passing through a cupola. The great variation in the results obtained by reliable experimenters has led to a general belief that there is no fixed rule which can be followed in figuring these cupola losses and gains. This idea, however, is incorrect, as I shall try to prove by taking up each metalloid separately.

SULPHUR.

Under ordinary conditions, iron melting in a cupola takes up sulphur from the fuel. The greater the percentage of fuel, and the greater the percentage of sulphur in the fuel, the greater will be the amount of sulphur absorbed by the molten iron. The ratio between the total amount of sulphur present in the fuel and the amount absorbed by the iron is dependent upon three conditions, first, the kind and quality of flux used; second, the temperature of the iron; and third, the composition of the coke and iron. A proper quantity of flux in a hot working cupola will take care of a considerable amount of sulphur. The sulphur present in the fuel as a sulphuretted hydro-carbon has no appreciable effect in increasing the percentage of sulphur in the melted iron. This accounts for the fact that many foundries melting with coal obtain castings with a lower percentage of sulphur in proportion to the amount of sulphur in the fuel than do foundries melting with coke. The greater the amount of manganese in the iron, the less sulphur will the iron absorb; and it is possible in cases of very high manganese iron for that iron to lose sulphur in melting; the sulphur passing off as manganese sulphide with the slag.

SILICON.

In passing through a cupola iron always loses in silicon. The amount of the loss depends upon two conditions: first, upon the

amount of oxygen brought in contact with the metal in melting, and second, upon the composition of the iron as it goes into the cupola. In giving the amount of silicon lost in passing through a cupola, authorities generally mention a fixed amount. This may have been true concerning the grade of iron with which the writers were familiar. But it would be wholly untrue concerning other grades. The greater the amount of blast, the more silicon will be burned out. The higher the percentage of silicon, the greater will be the percentage of loss in passing through a cupola. (By percentage of loss, I mean the ratio of lost silicon to the original amount of silicon in the pig.) An iron running four per cent in silicon will lose up to 20 per cent of its original amount, while the loss in an iron running .2 of 1 per cent is hardly perceptible. This variation in the loss of silicon is accounted for by the fact that the lower the percentage of silicon in the iron, the greater is the affinity of the iron for that silicon, and the more difficult will it be to oxidize it; while on the other hand, the greater the amount of silicon present in the iron, the less will be the affinity and the greater the amount oxidized in melting. The percentage of carbon in the iron has a great deal to do with the loss of silicon in melting. This, however, will be taken up later under the consideration of carbon.

PHOSPHORUS.

A very slight amount of phosphorus is absorbed from fuel by iron in melting. It is practically, however, a constant quantity, the small increase being proportional to the amount of phosphorus in the fuel.

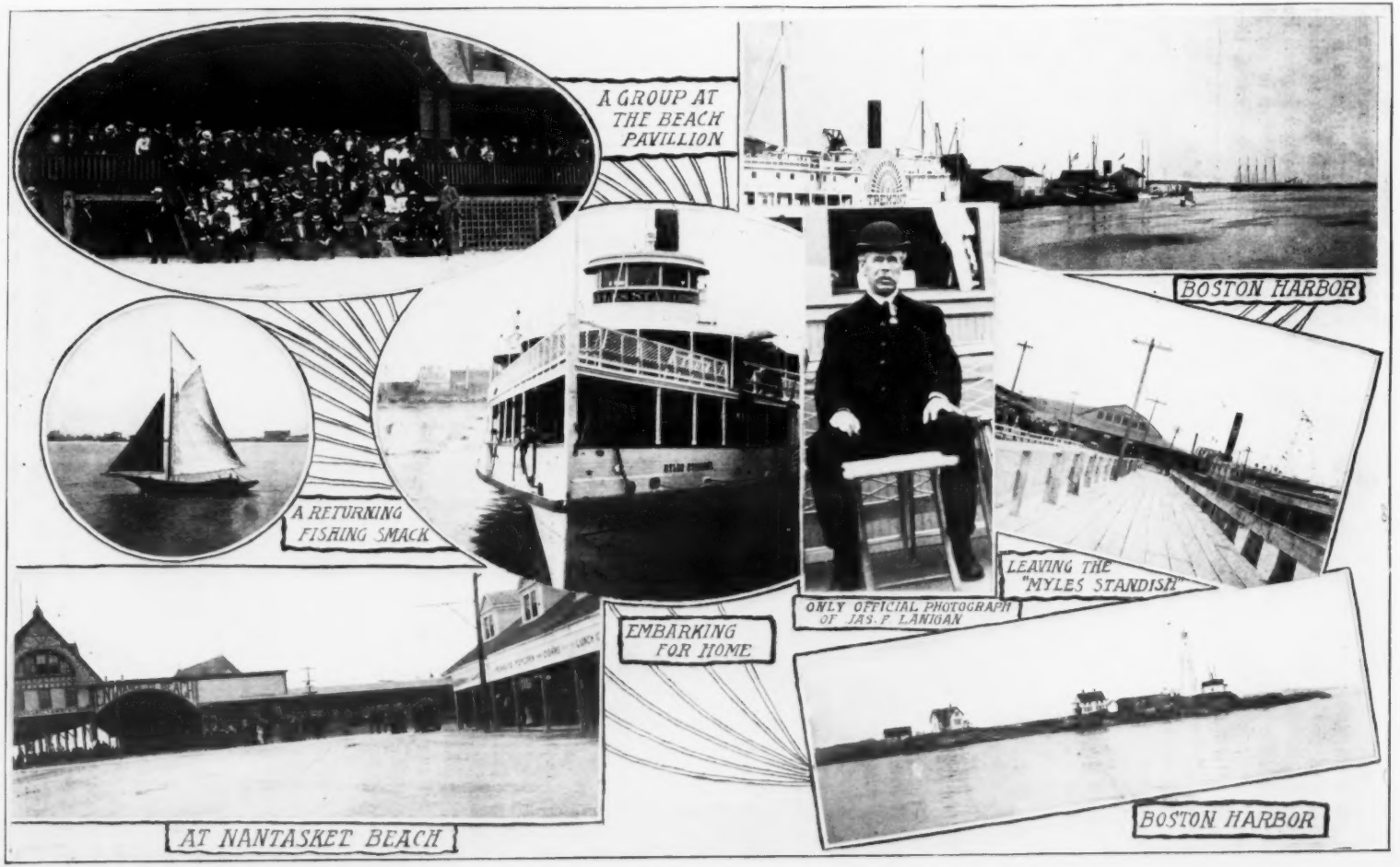
MANGANESE.

Manganese loses in passing through a cupola. Its action is that of a protector from oxidation and the amount lost in passing through a cupola depends upon the amount of blast and also upon the percentage of sulphur in the fuel. The greater the amount of air forced into the cupola the more manganese there is lost as an oxide. The greater the percentage of sulphur in the fuel, the greater will be the percentage of manganese passing into the slag as a sulphide. Manganese is not united with iron as a compound, it is rather alloyed with it, having practically no affinity for the iron.

CARBON.

I have left this element until the last for several reasons. Principally, however, because its action is understood less than that of the other elements which we have to consider in connection with melting iron. Carbon is really the life of cast iron. Various articles and papers have been written and much discussion has ensued in regard to the effect of melting upon the carbon in iron. Some say that it gains, others that it loses. If the founder is to be able to control his mixtures by chemical analysis, he must settle this question for himself. The articles written upon this subject are wholly misleading. In the early part of 1900, there appeared an article in *Machinery*, written by Mr. J. E. Johnson, stating that iron lost carbon in remelting. This brought a reply from Mr. Thos. D. West in the following number, in which he contended that iron gained carbon in melting. Mr. West presented a record of the remelting of the same iron five times. In every case the iron gained in carbon. In a recent number of THE FOUNDRY, Mr. W. J. Keep, in answer to a question stated as a positive fact that iron lost carbon in passing through a cupola. These opposing statements from authorities on mixing iron, can but discourage anyone who is attempting to learn from the writings of others the changes which iron undergoes in melting. A few weeks ago the following was referred to me by a foundry foreman. In order to determine the loss and gain in impurities in melting in his cupola he melted a quantity of No. 2 iron. He had the pig and the resultant casting analyzed and figured the differences. He then remelted some of the scrap from this heat alone. He had this iron analyzed and figured the change in carbon, etc. These two results were sufficiently conformative to allow him to figure that his cupola lost 10 per cent of the carbon in remelting. Some time afterwards, having occasion to make castings which required a very hard grade of iron, he had these castings analyzed and found that instead of losing 10 per cent of the carbon, his iron had gained in carbon in passing through the same cupola. It was a case of Mr. West and Mr. Keep illustrated in the same foundry. In the experiment of Mr. West, spoken of above, an iron running below 1 per cent in silicon was used, and this iron gained in carbon. In Mr. Keep's stove plate work, iron running high in silicon is invariably used, and such iron will always lose carbon in melting.

Iron may both gain and lose in carbon in passing through a cupola, and whether the gain


A GROUP AT THE BEACH PAVILLION
BOSTON HARBOR
A RETURNING FISHING SMACK
ONLY OFFICIAL PHOTOGRAPH OF JAS. F. LANIGAN
LEAVING THE "MYLES STANDISH"
EMBARKING FOR HOME
AT NANTASKET BEACH
BOSTON HARBOR

or loss predominates depends, first, upon the original composition of the iron, and second, upon the conditions or method of melting. An iron while passing down the cupola has a portion of its carbon burned off, the quantity depending upon the amount of blast and the time which the iron consumes in passing through that zone of the cupola, where the oxidizing influences are at work. After having a portion of its carbon removed, the molten iron comes in contact with the incandescent coke in the bed, and from this it absorbs carbon. The hotter the iron, the larger the amount of fuel, and the longer the iron remains in contact with this fuel, the more carbon will it absorb. If the amount of fuel is sufficient, the iron may absorb more carbon than it loses in passing the tuyeres, and thus the iron will have gained in carbon. If, however, the blast is heavy and the ratio of fuel to iron small, the iron will lose more carbon in passing through the oxidizing zone than it can possibly pick up from the bed, and thus the iron loses in carbon. These two conditions are at work every day in our cupolas. Melting with low blast and high percentage of coke will cause a gain in carbon, while the high blast and low percentage of coke will cause a loss of carbon.

The original composition of the pig iron will have much to do with the loss or gain in carbon. An iron made at the blast furnace with a large percentage of fuel will be high in carbon. This if melted in a cupola with a small amount of fuel will lose in carbon, while a pig iron low in carbon, made by a blast furnace using a small allowance of fuel, will, when remelted in a cupola with a relatively large amount of coke, gain in carbon. A low carbon iron, then, will tend to gain in carbon, while a high carbon iron will tend to lose in carbon in melting in a cupola.

There is one more factor which we must consider in discussing this loss or gain of carbon in cupola practice, and that is the effect or rather the relation of silicon to carbon in this process. I have said that low carbon iron gained in carbon. Let us now qualify this statement by saying that a low carbon, low silicon iron, will gain in carbon. Carbon and silicon, although they are analogous elements in many of their properties, have always been considered to be almost opposite in their action on cast iron. The facts of the case are, that their actions are almost identical, although the results are different. Pure iron we know will absorb carbon up to 6.67 per cent, while it will absorb silicon up to 23 per cent. One part of carbon then, is about 3½ times as effective on cast iron as is one part of silicon. We find this ratio to exist in our pig and cast iron to a marked degree. For every rise of 0.1 per cent in carbon in our pig iron made under the same conditions, there will be a corresponding decrease of 0.35 per cent in silicon, and vice versa. This applies in the same manner to our cupolas. When we melt a pig of say 3 per cent total carbon and 1 per cent silicon, we would expect under ordinary conditions, a gain in carbon. If, however, we melt a pig of 3 per cent carbon and 4 per cent silicon, we are sure, under the same conditions, to find a loss in carbon. Iron in the melted state may be thought of as a solution in which carbon and silicon each reduces the power of the iron to dissolve the other.

We have found then, that a small percentage of fuel, high blast, high carbon and high silicon tend to cause iron to lose in carbon, while low blast, large percentage of fuel, low carbon and low silicon tend to cause iron to gain in carbon in melting.

When we consider the great variety of iron in use in foundry practice, and the divergency in cupolas, we can readily understand that no hard and fast rule can be laid down for all cases. Every foundryman must find out for himself, in his own cupola, and with the brands of iron which he uses, or else he must obtain his knowledge from some one whose experience is similar to his own.

Are our cupolas so arranged as to produce at the least cost, the best iron for our work? Are we, in order to save a few cents, running them with the least fuel possible, and paying out at the same time, dollars to obtain the superior grades of iron necessary when iron is melted with little fuel? Are we melting with heavy percentages of fuel, and then adding limestone to reduce sulphur, and steel to reduce carbon? Are we using high silicon to soften, when it is really high carbon that is needed, or high carbon when it may be that high silicon would answer the purpose very much better?

For various kinds of work different grades of iron are required; stove plate and the like demand fluidity and softness, and to secure these an iron high in silicon, high in phosphorus, and rather low in carbon and manganese is most used. For light machinery, an iron high in silicon, medium in carbon and phosphorus, and low in sulphur and manganese

is necessary. Medium machinery requires an iron medium in silicon and carbon, low in phosphorus and manganese. In heavy machinery where weight rather than strength is desired, and where castings must be free from shrinks and segregations, iron low in silicon and phosphorus, high in carbon and manganese is essential, and a somewhat higher percentage of sulphur may be permitted. In castings where a high strength is desired, an iron low in silicon, low in carbon, low in phosphorus, low in sulphur, and medium in manganese is necessary. Cupolas then, should be so constructed as to best melt an iron suited for grades of its particular foundry.

The height of the tuyeres must regulate the manner in which the iron is taken from the cupola. Low tuyeres necessitate that the iron be drawn from the cupola as fast as it is melted, and either be held in a reservoir or taken away in small ladles. High tuyeres allow the iron to be collected in the hearth of the cupola and to be drawn off in large taps, and have the advantage of allowing crane ladles to be shifted while the iron is collecting in the cupola. When low tuyeres are used for filling crane ladles, if any time is apt to be lost in changing the ladles, two spouts should be used, one ladle being placed in position while the other is filling. We have mentioned that for stove plate and like grades of work, a high silicon, low carbon, low sulphur and low manganese iron is best suited. We have also mentioned that the amount of carbon and sulphur which an iron will absorb is dependent upon the amount of fuel which it passes through. Hence for stove plate and like work, the lower the tuyeres, provided they are consistent with good melting, the better suited will the iron be for the work. This does not interfere with the general practice in stove plate shops of removing the iron in hand ladles and by trolley tracks as fast as it is melted. Light and medium machinery castings require only a medium carbon percentage, and are much more advantageously melted in low tuyere cupolas. The somewhat lower silicon used in this line of work furnishes a higher carbon than is present in stove plate iron, and the small bed gives a low sulphur percentage. In the heavy machinery where softness and soundness are required, a large bed has an advantage. Low silicon irons which are cheaper may be used, and the carbon absorbed from the deep bed makes an iron high in carbon, while the resulting high percentage of sulphur is less detrimental in this heavy grade of work. The deep hearth allows the collection of a large amount of iron and thus makes the custom of tapping into crane ladles practicable. In the so-called strong irons, named by some gun iron, by others semi-steel, we have a somewhat more complicated problem. These irons must, first of all, be low in carbon and low in sulphur, and it is just such irons as these that absorb most readily carbon and sulphur from the fuel. There are cupolas in operation in many of our foundries from which it is practically impossible to obtain an iron above 28,000 pounds tensile strength for the reason that the height of the tuyeres requires so great a depth of fuel in the bed, that the iron will absorb an amount of carbon and sulphur so great that it is impossible to get a strong casting. For the melting of this grade of iron, low tuyeres are essential, and, of course, the iron must be removed from the cupola as fast as it is melted. The majority of cupolas in operation today have extremely high tuyeres, and we have seen that these are advantageous for but a single grade of work. In advocating the lower tuyeres for cupolas I have always met with the above mentioned objection in regard to changing the ladles in time to prevent the iron getting into the tuyeres. It is to obviate this difficulty that I suggest the double spout on cupolas which are so arranged as to make this possible. The modern tendency in building cupolas is to make the tuyeres as low as possible in order to show a high fuel ratio, and I venture to predict that they will be built much lower as soon as the double spout arrangement is more universally adopted.

The time has come when all foundrymen must unite in improving cast iron. There has been a tendency for each foundryman to keep to himself the results of his own investigation. This is no more than natural, but it has proved a short sighted policy. The fact that you can make a good quality of castings, is no excuse for allowing another founder, through his ignorance, to deprive the cast iron market of certain classes of work which an intelligent iron founder could supply as efficiently as can the maker of steel. There is a large amount of work now being made in steel which good foundry practice could have saved for cast iron. The engineer who has once been disappointed is not apt to blame the maker so much as the product, and so steel is specified where cast iron, through faulty practice, has failed. In its struggle to hold its own cast

iron must look to advanced cupola practice for its mainstay. Every branch of the iron business is advancing with rapid strides. Our foundries must wake up to a realization of these conditions. Engineers are more strict in their requirements of cast iron, while founders are drawing closer specifications around the pig iron furnace men. They in turn are constantly advancing, and I believe in spite of statements to the contrary, that blast furnaces have never produced a better and more uniform product than they are producing today. The adoption of standard methods for analyzing and testing, the agitation for improved grading, prove the steady progress in those branches which are vital to future foundry success. Let us then look to our cupola practice, and see to it that in the general progress the very heart of our foundry is not neglected.

Paul R. Ramp prepared for the convention a paper under the title of

Economy.

In our efforts to cut expenses we sometimes begin at the wrong end, and as the old saying is "We spend a dollar to save a cent." During my experience as a foundry man, I have heard many men express their views as to cheapest methods of production. While I have often been able to profit by suggestions, I have listened to some arguments which were amusing. In order to produce good work, work that must come up to given specifications, we must use good material. I have a personal dread of cheap blacking, cheap foundry flour, poor molding sand, soft coke, poor iron, etc.

A poor grade of material can be purchased for nearly one-half the cost of a better and more suitable article. Yet it is generally economy in the end to purchase the best, as the reduction in loss of bad castings will in many cases exceed what is gained by the reduced price of the cheaper material. For instance, a foundry flour may be purchased at one-half what the regular supply is costing us, yet when a carload is received we find it is necessary to use about twice as much as of the old flour to do the same amount of work. This is detrimental in more ways than one.

In making cores or dry sand molds, the more flour there is used in the sand mixture, the more gas there is generated. And the more vegetable matter we have to produce an excessive amount of gas, the greater possibilities there are for a cut, scab, or a blow, which results in a bad, or dirty casting. The greater the amount of flour we are forced to use in order to make strong cores or molds, the more they will swell while drying. This causes them to vary in shape and size.

Another item is "plumbago," "blacking" or "dry sand facing." We may be paying 4 or 4½ cents per pound for a lead that is doing good work and pealing the castings in a very satisfactory manner, when along comes a "supply man" and induces the purchasing agent to buy a carload of a cheaper lead, say for 2½ cents per pound. This lead, he will probably say, is used by several large concerns, whose product we know is all that could be desired. Here is where the impractical man is led astray. He does not consider what quality of sand the parties referred to are using behind this lead; perhaps this is a good open sand that would do the work nearly as well without any lead or facing. We try this lead on work where the sand is close and contains matter which promotes the formation of gas, and this creates in the molten metal an uneasy motion while it is being poured and after the mold is filled before it solidifies. This action of the iron causes additional wear on the surface of the mold and the cheaper grade of blacking will wash and rise to the surface, thus producing a dirty casting.

Poor molding sand is a great drawback. I have in mind a firm that obtains a very poor grade of molding sand from a supply house some 200 miles away, when better sand could be dug within one mile of the shop. The only objection is, this good sand cannot be shipped in carload lots, but must be hauled by wagon loads, which is really preferable as it is an easy matter to reject the wagon load of poor sand, while it is no small job to be compelled to work up three or four carloads of inferior material.

Poor coke causes much trouble. I know of a large concern in the west who use a very cheap grade of soft coke for melting purposes because it can be purchased at about $3 per ton less than good 72-hour coke would cost. They claim a saving in this method, but it is my belief that if they should consider the extra time consumed in melting and the castings that find their way to the scrap pile on account of dull iron, they would realize that there is more economy in using a good grade of coke. The same is true where one blower is used to furnish wind for two cupolas, and the capacity of the blower is but a little more than is re-

quired for one cupola. This makes it necessary to put the blast on at say 12:40 or 1 o'clock, and with two cupolas, one 60 inches and one 48 inches diameter, it is a good job to melt 60 tons by 5 o'clock, which means 15 tons per hour for two cupolas. Now, if an independent blower were used for each cupola, with the proper tuyere location, the time consumed in melting could be cut nearly in half. This would make it possible for the molder to work up till 3 o'clock p. m. at molding, instead of beginning to pour off at 1 o'clock, which would mean two hours more. This would in a short time pay for several new blowers.

PAUL R. RAMP.

When we refuse to give our molders good flasks and good patterns to work with in order to save, we often lose more in bad work than it would take to build new patterns and flasks, to say nothing of the delays caused by failures of molders to make good work, which may be directly traced to poor rigging.

To those who have always considered the building of flasks an unnecessary expense, and have practiced the most rigid economy in regard to them, I want to say that good molders are hard to get and expensive. In shops where the proper appliances cannot be secured, they are hard to keep. But if we make the equipment of the foundry a personal study, and build our flasks, patterns, etc., in a manner that will simplify the work regardless of first cost, the question of good molders will be settled. With all conditions as they should be and the work and methods made easy it is possible to develop good molders out of what men we have in our own shop, or even out of men that have never handled a rammer or shovel. I would prefer the latter as I believe there is much more economy in teaching a green man how to mold and paying him for scrap castings for a couple of weeks, and later receiving a fair day's work from his floor the year around, than there is in compelling a molder who has worked at the trade all his life to work in a different manner than he has been accustomed to.

The idea of economy with reference to pattern making is in some cases a delusion. For instance it is more expensive to give a large gang of men one locomotive cylinder pattern and have them ram and finish two or more a day, than it would be to make two or more patterns and let them make one a day each. Two molders will accomplish more than one-half of what four men will accomplish on the same job with only one pattern. Besides this, much better work is the result of placing fewer men on the job. Hence where we have a number of castings to make in a rush, it is cheaper to build an extra pattern than to crowd too many men on one pattern.

In making iron flasks for locomotive cylinders it is economy to make separate flasks for the different sizes, where there is any great variation. It is false economy to try to use one large flask for all sizes. The reason is plain enough. On the small ones the same amount of labor is required to ram it up as on a large one when one large flask is used. And in drying the mold double the amount of fuel and time is required, to say nothing of the danger of the large body of sand sagging and causing the mold to lose its proper shape.

There are many other things that could be mentioned which cause much waste, such as insufficient dry sand and core oven capacity, crooked core plates, improperly constructed patterns, system of handling melted iron, castings, sand, flasks, etc. The different items I have made mention of in the above are not new to foundrymen. Although we all realize that these things help to increase the costs of production, there are many foundries today where just such conditions prevail.

Chas. Vickers chose for his subject some features connected with

Brass Melting.

When brass is melted on a large scale, the furnaces are a very important part of the plant, and it pays to do considerable thinking and figuring before building them. The character of the castings to be made must always influence the size of the furnace, as small furnaces are much more economical for the production of small and light castings than large ones. This is a thing not always considered, however, so that it is a common sight to see a "30"

pot put into a furnace intended for a "100." The coal dealer may never kick at this, but his debtors often do at the size and frequency of his bills.

Here, then, is one point in brass melting, whatever the size of the furnaces, 3 inches of solid fuel around a crucible will do as much work as 6, and is more economical in fuel, labor and metal. The fuel saving is apparent without a thought. The labor saving requires a little more effort to perceive. We must consider the extra shoveling and "poking down" required by the larger furnaces, while as to metal saving, some people may not see that point at all unless it is explained. The larger the fuel surface, the greater the heat thrown towards the furnaceman when he removes the cover, and the greater the temptation to stand away off, and "peg" the metal at the crucible when the foreman isn't looking.

Some melters become quite expert at hitting the crucible, and most of the metal charged finds its way therein. But they can never overcome the splashing when a chunk drops into the liquid contents of the pot, and most of these splashes are lost in the fuel and they are metal. So this is bad practice, and generally costs more than the loss of fuel. Another little point to be considered in economical melting, is never to charge up a pot unless one is reasonably sure that the molds are going to be ready when the metal is, because it costs money to "hold" a pot in the furnace, as is frequently done. Then again, the much abused crucible will wear away as much or even more, when only half filled than when filled. Never build or allow your furnace to become "barrel shaped," highfaluting theories to the contrary notwithstanding. A straight wall is always the best.

As far as we have gone with these remarks no particular style of furnace has been recommended as being better than others, because most brass founders have their own theories in this respect, and although they may differ in minor details, most solid fuel furnaces bear a general resemblance to each other so much so that there is another defect so serious and so universal, that lots of good strong language might with advantage be used thereon.

Not that there is any intention of using strong language here, we will leave that in the shop mixed with the gas that causes it, and in a few mild words explain the trouble, and suggest a remedy. As before mentioned, this trouble is caused by gas, the products of combustion being too often driven into the shop, polluting the atmosphere to such an extent that the health of the human beings employed therein is seriously endangered. For molders are human beings, although some people seem to doubt it and think that anything will do for people employed at such dusty, dirty work.

Many founders imagine that when power is applied to furnaces it is impossible to carry off all the gases, and so it is, with flues adequate for natural draught, but when the air supply to a furnace is increased by the application of a fan beneath the fire the flue area must also be increased, unless the same was abnormally large before the fan was applied.

So if there is gas in your shop your flues are too small; the remedy is to enlarge them; do not go to the trouble of cutting holes in the roof or to the expense of placing ventilating fans, which you will find are failures so far as removing the gases is concerned. And right here, let me impress the fact that it is not always the main flue which is faulty; most founders make this generous in size; turn your attention to the flues connecting each furnace to the main flue. Your foreman may pooh-pooh the idea and advance all kinds of theories to the contrary, but do not listen to him, he needs educating on this point and see that he gets it, or get a new foreman.

CHAS. VICKERS.

There is no evading the fact that if a flame is driven from beneath the covers of furnaces, the products of combustion are being driven into the workshop instead of through the proper channels into the outer air where they are harmless. In place of driving air through a furnace, in some few cases the fan has been placed in the flue and by exhausting the air therefrom creates a strong draught through the flues, the furnace being operated the same as natural draught, that is with open ash pits.

With this system a high chimney is not nec-

essary and the atmosphere of the shop is entirely free from contamination by the products of combustion. It possesses one disadvantage to careless people, and that is the flues and their connections must be kept in good condition; should they be permitted to fall into decay, the melting capacity of the furnaces would diminish in proportion to the air leakage.

For this reason, unless exceedingly well built, brick flues are not so well suited to this system as are iron ones, because the average brick flue, built by the average brass melter or his foreman, is never built as well as the poorest bricklayer would do it, and consequently rapidly crumbles under the racking effects of expansion and contraction.

When sheet iron is used for brass-furnace flues, they are best when made circular in form, with rectangular cast iron connections to each furnace, the main sheet iron flue must be suspended and not allowed to touch a wall or any non-conductor, if the air has free access to it the flue will rarely become red hot, and will consequently give good and economical service.

If the heat radiated from the flue troubles the melter, which it probably will, do not sheathe it in asbestos, or you will soon have nothing but an asbestos paper flue and a poor one at that, but hang a curtain of asbestos in such a manner as not to touch the flue, but still shield the melter.

Lecture by Albert Sauveur.

Albert Sauveur, of the Boston Testing Laboratories and editor of the *Metallographist*, was then introduced and gave an interesting lecture on the application of metallography to foundry work, illustrating the same with large photographs and stereopticon views. His first remarks concerned the close analogy between the structure of cast iron and the structure of steel. He said that it was the general impression among foundrymen that cast iron and its constituents are much harder to deal with than steel, and that the prevailing opinion is that there is no relationship whatever between the two. Remove graphitic carbon from cast iron and we have almost steel. In order that we may obtain an intelligent understanding of the constituents of iron we should look into the structure of steel.

Large photographs were then shown of microscopic views of pure gold and pure iron which showed that both were composed of masses of irregular grains. A similar photograph of a particle of wrought iron showed black spots due to the slag. Another photograph showed an entire change of structure due to the introduction of a small amount of carbon thereby converting the wrought iron into soft steel. Additional views showed the structural changes due to further increase in the amount of carbon and the structures of both medium and hard steel were illustrated. Photographs were then shown of the structure of white cast iron, which should be considered as a very high carbon steel and the similarity between the two was very apparent.

Another photograph exhibited showed that gray cast iron was made up of a matrix of steel and particles of graphite. Other photographs were exhibited showing increasing amounts of combined carbon and then the relationship between the strength of cast iron and its structure was illustrated by stereopticon views. In closing the lecturer said that the microscope has given the metallurgists an opportunity of studying the matrix of both iron and steel and the changes therein by the additions of various substances to increase or diminish the strength and other properties of the same. Prof. Sauveur was tendered a vote of thanks and was invited to present a paper during the year dealing with this matter in still more detail.

Other papers prepared for this meeting, which were read by title only and on which no action was taken owing to a lack of time include "Foundry Accounting" by James G. Stewart, "Cast Iron" by Percy Longmuir, and a contribution by E. H. Putnam suggesting that the apprenticeship period for molders be reduced to two years in the specialty lines of the trade. After referring to the long apprenticeship served in European countries, the author contends that conditions at the present day do not warrant the retaining of the beginner for four years even, as two years' application will accomplish more towards perfecting a mechanic along modern lines of manufacture than four years under the ancient regime, when the majority of artisans were of the all around character instead of specialists.

Those in Attendance.

Richard Moldenke, New York; A. W. Walker, Bartlett M. Shaw, F. D. Stevens, Thos. E. Inslee, C. C. Hodges, Robert Blyth, C. F. Belcher, Walker & Pratt Mfg. Co. Watertown, Mass.; J. F. Blauvelt and J. G. Aldrich, New England Butt Co., Providence, R. I.; Richard Carroll, Carroll Foundry & Machine Co.,

Houghton, Mich.; H. B. Buckingham, Geo. B. Buckingham, Arcade Malleable Iron Co., Worcester, Mass.; Alva Carpenter, Henry A. Carpenter, Walter M. Saunders, A. Carpenter & Sons Foundry Co., Providence, R. I.; A. J. Miller, A. J. Miller, Jr., Geo. S. Bullock, Whitehead Brothers Co., Providence, R. I.; J. D. Smith, J. D. Smith Foundry Supply Co., Cleveland, O.; J. F. Mills, Abendroth Bros., Port Chester, N. Y.; C. F. English, Walter C. English, *The Iron Age*, Boston; W. L. Ducey, W. H. Herne, Fred F. Stockwell, H. R. Luther, John P. Winlock, F. H. Ellis, F. W. Richardson, S. M. Thompson, F. A. Hoyt, Richard H. Penney, Barbour-Stockwell Co., Cambridge, Mass.; John W. Burr, Burr & Houston Co., Brooklyn, N. Y.; John Magee, J. W. Winchester, Magee Furnace Co., Boston, Mass.; Chas. T. Colvin, T. H. Colvin, E. H. Colvin, Colvin Foundry Co., Providence, R. I.; L. S. Brown, Springfield Facing Co., Springfield, Mass.; Victor Swenson, Geo. H. Gibby, Harry Gibby, Condor Iron Foundry Co., Boston, Mass.; Geo. H. Lincoln, N. J. O'Donnell, F. B. Foster, Geo. H. Lincoln & Co., Boston, Mass.; Arthur W. Gibby, G. H. Carson, Mechanics Iron Foundry Co., Boston, Mass.; David Reid, Saco & Pettee Machine Shops, Biddeford, Me.; L. W. Perault, Jenckes Machine Co., Sherbrooke, Quebec; T. J. Best, Warden King & Son, Ltd., Montreal, P. Q.; R. S. MacPherran, Allis-Chalmers Co., Milwaukee, Wis.; C. J. Wolff, Alfred Rossow, L. Wolff Mfg. Co., Chicago, Ill.; Lewis McPhee, Hugh McPhee, Eaton, Cole & Burnham Co., Bridgeport, Conn.; Arch. M. Loudon, New York, N. Y.; C. L. Prince, General Electric Co., Schenectady, N. Y.; J. W. Busch, Pratt & Cady Co., Hartford, Conn.; J. W. Conway, Hartford Foundry Co., Hartford, Conn.; O. C. Beck, Colorado Iron Works, Denver, Col.; Frederick Conlin, Bethlehem Foundry and Machine Co., Bethlehem, Pa.; Paul R. Ramp, W. H. Namack, American Locomotive Co., Schenectady, N. Y.; S. T. Johnston, Wm. Fitzpatrick, S. Obermayer Co., Cincinnati and Chicago; F. M. Etting, E. J. Etting, Philadelphia, Pa.; J. P. Golden, Golden Foundry & Machine Co., Columbus, Ga.; D. F. Egan, E. A. Pridmore, H. E. Pridmore, Pridmore Molding Machine Co., Chicago, Ill.; J. Gilmour, J. Gilmour and Northern Engineering Co., New York, N. Y.; J. Frank Dye, Newport Sand Bank Co., Newport, Ky.; L. M. Fenner, New York Air Brake Co., Watertown, N. Y.; Geo. W. Cope, *The Iron Age*, New York; John D. Ormerod, Donaldson Iron Co., Emaus, Pa.; A. W. Link, Erie Foundry Co., Erie, Pa.; Charles Thomas, Syracuse, N. Y.; Joseph L. Anthony, Weir Stove Co., Taunton, Mass.; D. L. Kent, C. A. Reed, J. O. Henshaw, W. L. Welch, N. S. Bartlett & Co., Boston, Mass.; A. O. Backert, *Iron Trade Review*, Pittsburg, Pa.; D. C. Warren, THE FOUNDRY, New York; Fred A. Fisher, Enterprise Foundry Co., Sackville, N. B., Canada; Henry Hansen, THE FOUNDRY, Cleveland, O.; W. F. Prince, International Steam Pump Co., Elizabeth, N. J.; Geo. A. Drysdale, Jr., Howard & Bullough American Machine Co., Pawtucket, R. I.; W. Bylund, Birmingham Iron Foundry Co., Derby, Conn.; H. W. Johnson, Pratt & Whitney Co., Hartford, Conn.; C. C. Boyden, Matthew Addy & Co., New York, N. Y.; E. H. Mumford, J. W. Dopp, C. S. Lowell, Tabor Mfg. Co., Philadelphia, Pa.; C. D. Palmeter, F. J. Giles, Watertown Engine Co., Watertown, N. Y.; W. E. Farrell, Diamond Drill & Machine Co., Birdsboro, Pa.; H. E. Field, Farrel Foundry & Machine Co.; Ansonia, Conn.; Ronald Drysdale, Boston, Mass.; Louis Wiard, Wiard Plow Co., Batavia, N. Y.; Marton Otis, N. E. Gas & Coke Co., Boston, Mass.; Charles H. Billings, Barney & Smith Car Co., Dayton, O.; Andrew Macduff, Stilwell-Bierce & Smith-Vaile Co., Dayton, O.; E. K. MacNutt, Watertown Arsenal, Watertown, Mass.; A. K. Beckwith, Beckwith Estate, Dowagiac, Mich.; Fred C. Ringer, Hawley Down-Draft Furnace Co., New York, N. Y.; C. S. Bell, Eddy Richard, C. S. Bell Co., Hillsboro, O.; W. H. Coffin, Frank Thompson, T. P. Kelly & Co., New York, N. Y.; S. D. Tompkins, Smooth-On Mfg. Co., Jersey City, N. J.; B. F. Pierson, Hanson & Van Winkle Co., Newark, N. J.; Edw. B. Gilmour, Filer & Stowell Co., Milwaukee, Wis.; A. E. Martin, Pedrick & Ayer Co., Philadelphia, Pa.; E. J. Lambert, Syracuse Chilled Plow Co., Syracuse, N. Y.; F. L. Bromley, Detroit Foundry & Mfg. Co., Detroit, Mich.; R. C. Bird, Broadway Iron Foundry Co., Cambridge, Mass.; R. F. Flinterman, Chicago; J. F. Lanigan, Davis Foundry Co., Lawrence, Mass.; E. E. Durant, G. F. Warner Mfg. Co., New Haven, Conn.; Harry Oldfield, Watertown Arsenal, Watertown, Mass.; Edgar W. Anthony, Smith & Anthony Co., Boston, Mass.; Wallace C. Griffith, Watertown, Mass.; Clarence H. Joslyn, Merrimac Iron Foundry, Lawrence, Mass.; J. W. Littlefield, Hub Wire Works, Boston, Mass.; Hugh W. Adams, New York; James C. Alley, R. W. Page, C. L. Peirson, New York; William J. Breen, Hugh W. Adams, Boston, Mass.; Thos. O'Halloran, International Power Co., Providence, R. I.; L. Renick, Jr., Michigan Drug Co., Detroit, Mich.; Frank L. Codman, John C. Codman, N. S. Hart, F. L. & J. C. Codman, Boston, Mass.; A. W. Slocum, Keystone Car Wheel Co., Pittsburg, Pa.; J. P. Pero, Malleable Iron Fittings Co., Branford, Conn.; F. H. Stevens, Somerville, Mass.; John McLaren, Phillips & McLaren, Pittsburg, Pa.; S. H. Stupakoff, The Fullman Co., Pittsburg, Pa.; J. S. Seaman, Charles B. Seaman, Seaman-Sleeth Co., Pittsburg, Pa.; E. J. Lyon, Brown & Sharpe Mfg. Co., Providence, R. I.; A. E. D'Orsay, M. W. Alexander, General Electric Co., Lynn, Mass.; James A. Kirby, Brown Bros. Mfg. Co., Chicago, Ill.; J. J. Burgen, Lane Mfg. Co., Montpelier, Vt.; Charles Bailey, Reliance Steel Casting Co., Pittsburg, Pa.; G. W. Knotts, United Engineering & Foundry Co., Pittsburg, Pa.; S. A. McRoberts, *American Manufacturer*, Pittsburg, Pa.; James A. Murphy, Ball Engine Foundry Co., Erie, Pa.; D. J. Thomas, Sterrit-Thomas Foundry Co., Pittsburg, Pa.; L. M. Jenkins, Pittsburg, Pa.; S. D. Sleeth, Westinghouse Air Brake Co., Pittsburg, Pa.; F. E. Gordon, Ohio Sand Co., Conneaut, O.; Wm. Yagle, Wm. Yagle Co., Ltd., Pittsburg, Pa.; Wm. W. Lobdell, Lobdell Car Wheel Co., Wilmington, Del.; Josiah Thompson, J. Thompson & Co., Philadelphia, Pa.; E. B. Pierce, Wheeler Foundry Co., Worcester, Mass.; Henry Wright, Buckeye Malleable Iron & Coupler Co., Columbus, O.; F. H. Zimmers, Jr., Union Foundry & Machine Co., Pittsburg, Pa.; Thomas I. Rankin, Albert I. Meyer, Abram Cox Stove Co., Philadelphia, Pa.; J. S. McCormick, J. S. McCormick Co., Pittsburg, Pa.; E. G. Whitney, Kidder Press Co., Dover, N. H.; E. B. Cook, Warwick Iron & Steel Co., Pottstown, Pa.; A. L. Nash, Dalton, Nash & Co., New York; W. S. White, J. S. White Co., Pawtucket, R. I.; Thomas D. West, Thos. D. West Foundry Co., Sharpsville, Pa.; Robert P. Cunningham, Chas. S. Newcomb, Deane Steam Pump Co., Holyoke, Mass.; G. A. Reed, Reed & Son, Gloucester, Mass.; Chas. B. Moore, Allen M. Pierce, International Steam Pump Co., Boston, Mass.; Jacksonville Bartley, A. L. Hassis, Dixon Crucible Co., Jersey City, N. J.; W. D. Trabue, Phillips & Buttorff Mfg. Co., Nashville, Tenn.; S. H. Baird, Pilling & Crane, Philadelphia,

Pa.; Edward H. Schwartz, Hawley Down-Draft Furnace Co., Chicago, Ill.; C. H. Fisher, Blanchard & Fisher, Boston, Mass.; William C. Doherty, Doherty Bros., Lowell, Mass.; Richard Denbigh, Hay Foundry & Iron Works, Newark, N. J.; C. H. Stevens, Somerville, Mass.; H. E. Wetherbee, Jas. Hunter Machine Co., No. Adams, Mass.; Arthur L. Rice, *Engineer*, Cleveland, O.; Henry M. Lane, M. E., School of Mechanical Engineering, Scranton, Pa.; L. D. Gilbert, Frick Co., Waynesboro, Pa.; Edward Robinson, Wells Light Mfg. Co., New York; Andrew McKee, Hawley Down-Draft Furnace Co., New York; H. W. Bullard, Poughkeepsie Foundry & Machine Co., Poughkeepsie, N. Y.; Eli Millett, H. N. Belleville, Millet Core Oven Co., Springfield, Mass.; Enrique Touceda, Albany, N. Y.; Stanley G. Flagg, Stanley G. Flagg & Co., Philadelphia, Pa.; F. C. Brookshank, E. T. Warden & Sons, Philadelphia, Pa.; John Warden, E. T. Warden & Sons, Boston, Mass.; Charles A. G. Winther, Chapman Valve Mfg. Co., Indian Orchard, Mass.; C. D. Shepard, Wm. M. Crane Co., Peekskill, N. Y.; J. E. Plimpton, J. Plimpton Co., Norwood, Mass.; F. W. Stickle, B. F. Sturtevant Co., Boston, Mass.; Ben Gomersall, Mechanics Foundry & Machine Co., Fall River, Mass.; C. H. Bird, H. H. Adams, New York, N. Y.; Charles T. Cottrell, R. A. Mason, E. E. Whippen, C. B. Cottrell & Sons Co., Westerly, R. I.; R. W. Marble, Clyde Iron Works, Duluth, Minn.; Patrick Shields, Arthur E. Shields, George C. Shields, Shields Foundry Co., Mansfield, Mass.; George H. Conant, W. Somerville, Mass.; George W. Briggs, Lamb Knitting Machine Co., Chicopee Falls, Mass.; Robert Gilchrist, Rogers Brown & Co., New York, N. Y.; Joel M. Bense, W. H. Bense, Kinsley Iron & Machine Co., Canton, Mass.; W. F. Thatcher, W. H. Larrison, R. D. Wood & Co., Florence, N. J.; S. M. Rodgers, American Steel & Wire Co., Worcester, Mass.; E. P. Osgood, Osgood & Witherby, Boston, Mass.; Albert Sauveur, N. C. Kinsbury, F. J. Herrick, Boston Testing Laboratory, Boston, Mass.; Walter M. Wood, Manning, Maxwell & Moore, Boston, Mass.; E. C. Stokes, *Domestic Engineering*, Boston, Mass.; Richard Reed, H. B. Smith Co., Westfield, Mass.; Chas. Mills, Saco & Pettee Machine Shops, Newton Upper Falls, Mass.; Wm. H. Baush, Baush Machine Tool Co., Springfield, Mass.; Henning Borgstedt, De La Verna Refrigerating Co., New York, N. Y.; W. A. Garrett, Whiting Foundry & Equipment Co., Boston, Mass.; C. Hitch, Jr., American Tool & Machine Co., Hyde Park, Mass.; Chas. R. Earle, Phœnix Iron Foundry, Providence, R. I.; H. W. Thomas, O. G. Thomas, Chas. A. Coleman, O. G. Thomas, Taunton, Mass.; H. F. Livermore, Boston, Mass.; J. Hayes, Hayes Foundry Co., Lynn, Mass; C. L. Lanigan, Davis Foundry Co., Lawrence, Mass.

Convention Echoes.

If the foundrymen had anything to say about the coronation of anybody John Magee would be their choice as special ambassador.

F. F. Stockwell worked overtime during the convention and obtained a taste of the strenuous life with which our generation is blessed. Fred is a good fellow and thinks more about the welfare of others than his own convenience.

And the ladies all said that L. S. Brown was the nicest man they ever came across.

Then there is George H. Gibby, who never went home until the last visitor had disappeared.

And Carpenter, Henry A., the Rhode Island terror, who could draw nine kinds of drink from one bottle, well, you saw him at Nantasket.

The Chicago end of the continent was shy in anteing up delegates, but then who would think of finding fault as long as Chris J. Wolff was there.

Bartlett M. Shaw not only knows how to keep a foundry up to the highest state of perfection, but he is also one of the boys who is right at home in handling big crowds. No wonder the Walker & Pratt plant and management are popular.

That whole bunch of New England foundrymen is a cheerful set of entertainers. Business must be good in that neighborhood or they couldn't look so pleasant.

Fitzpatrick and Johnston took good care that the name of Obermayer was not hidden. They stirred up quite a breeze.

Geo. W. Cope of *The Iron Age* has been associating with foundrymen so many years that he talks and acts like one of them.

That heavy-weight Pridmore team gave the East an idea of what is behind Western enterprise.

J. D. Smith made it a hard and fast rule that all visitors should call before 11 p. m. or send up their cards.

Colonel Dye showed the kind of castings which can be turned out in sand from the Blue Grass State. Here's to Kentucky.

Mumford, Lowell and Dopp looked after the Tabor interests and set up vibrations in favor of Power Ramming of Molds.

The absence of T. P. Kelly was a mystery, until it was announced that he had been given passports to represent the Plumbago Club abroad for sixty days. Further particulars may be obtained by applying to Frank Thompson.

J. S. McCormick answered all inquiries made concerning Pittsburg and vicinity. Incidentally he held several receptions not noted in the official programme.

Edward Robinson came over from New York to shed a little light on the gathering.

Eli Millett didn't carry any samples of core ovens with him, but then everybody knows what they look like and what they will do.

The A. J. Millers, Sr. and Jr., of the Whitehead Bros. Co., came up from Providence just to watch the good time their customers were having.

F. M. Etting was heard to remark that he would like to see the cupola that could beat the Whiting.

A. L. Hassis met the crowd for the Dixon Crucible Co.

J. Gilmour was kept busy explaining the longevity of his double-geared tumbling barrels.

The pig iron men were scarce at the Boston meeting, and Robert Gilchrist of Rogers, Brown & Co., had his hands full to satisfy the founders that they would have all the pig iron they needed, by and by.

George H. Lincoln also showed his ability to lead a strenuous life.

Edward H. Schwartz, inventor of the furnace which bears his name, had to explain to many of the visitors how the works were made to go around.

Among the Foundries.

The Pierce Engine Co., of Racine, Wis., will extend its foundry by an addition 60x100 feet.

The Kenton Hardware Mfg. Co., of Kenton, O., will increase the capacity of their foundry.

The Richards Iron Works, Birmingham, Ala., composed of Joseph C. and Charles J. Richards, have taken over the plant and business of John D. Lykes.

The Buffalo Foundry Co., Buffalo, N. Y., have decided to increase their capital stock to $200,000 and will build one of the largest and best equipped jobbing foundries. The plant will consist of one main foundry building 320x145 feet, steel structure, equipped with two 30-ton and four 10-ton electric traveling cranes, six 5-ton jib cranes and six 2-ton jib cranes, one 102-inch, one 84-inch and one 66-inch cupolas; one 15-ton air furnace, together with compressed air plant and every known modern appliance for the economical production of castings from the lightest up to the very heaviest; pattern making and storage building, 50x200 feet, three stories high; supply building, 30x320 feet, for the storage of raw materials. It is the intention of the company to use electric power throughout, obtaining this from the Niagara Falls power station. The plant is being so arranged that an open-hearth steel department, 145x400 feet, can be added, together with what machine shops are found necessary.

The Atlanta Stove Works, Atlanta, Ga., have contracted for the entire output of the Alabama Mfg. Co., Birmingham, Ala. consisting of all forms of hollow-ware.

The Mason Heater Co., of Bellaire, Ohio, will erect a foundry 60x100 feet.

The Kutztown Foundry & Machine Co., Kutztown, Pa., are erecting a machine shop, 100x100 feet, so arranged that it can be extended to 400 feet in length; the foundry, 130x200 feet in length, also arranged so that it may be extended to 400 feet in length; a cleaning house, 35x80 feet, connecting the two at one end, forming a frontage of 310 feet. This new plant will be equipped with modern machinery of every character and is to be operated in connection with the present works entirely by electricity, supplied from a central power plant.

The Western Steel Car & Foundry Co. have been granted a New Jersey charter with a capital of $1,250,000 for the purpose of taking over the plant of the Illinois Car & Equipment Co., at Hegewisch, Ill. The Pressed Steel Car Co. is heavily interested in the new concern.

The Homestead Valve Co. have bought a tract of land adjoining their plant at Homestead, Pa., and are completing plans for the erection of a brass foundry.

The Howery Mfg. Co. have been organized at Chester, Pa., with a capital of $200,000 and the following officers: J. D. Howery, president; T. Burd Zeil, secretary; Wm. H. Berry, treasurer. Work on the main building, which will be 544 feet long by 106 feet wide, is to be started at once and the entire plant is expected to be completed in about six months. The main shop will be equipped with two 50-ton electric cranes, and the plant will be electrically operated throughout. There will be two air furnaces, one of 20 tons and the other of 40 tons capacity, and an 84-inch cupola. This equipment will give the new concern the ability to handle the largest class of castings. Mr. Howery, who is also superintendent of the Gruson Iron Works at Eddystone, Pa., contemplates the addition of a steel casting department at an early day and has under consideration a plan of drying molds and cores by the waste heat from the furnaces, which is expected to show considerable saving.

The Steele & Robinson Co., who have recently been incorporated at Williamsport, Pa., with a capital of $50,000, will remodel the plant formerly used for making the Backus heater to suit their business. They will engage in

the manufacture of gray iron castings, radiators and steam and hot water heaters, and expect to employ 50 men. George P. Steele has been elected president and general manager.

The Abbott Electric & Mfg. Co., of Warren, Ohio, have changed their firm name to the United States Brass & Mfg. Co.

The Medina Foundry Co., of Medina, Ohio, have been incorporated with $15,000 capital stock by F. O. Phillips, Arthur Van Epp, H. C. Bradway, C. C. Engel and Blake McDowell. They have purchased a foundry and will enlarge it for the manufacture of stove castings.

The Richmond Co., organized with a capital of $500,000, will take over the business of the Richmond Stove Co., Norwich, Conn. The officers are: W. S. McMullen, president; Wm. N. Blackstone, vice president; T. G. Haywood, secretary and treasurer. A large addition has recently been completed and the company now have under construction a new foundry building 150x150 feet.

C. L. Grimes has sold his interest in the Wichita Mfg. Co. to his former partners, J. F. Warren and Henry Anthony, who have incorporated the Wichita Bridge & Iron Co., with a capital of $25,000. The new company is a consolidation of the Wichita Bridge Co. and the Wichita Mfg. Co. Officers have been elected as follows: G. H. Bradford, president; Henry Anthony, vice president; E. D. Miles, secretary and engineer, and J. F. Warren, treasurer.

The Ohio Solid Steel Co. has been incorporated under the laws of New Jersey, for the purpose of conducting a steel foundry in Cleveland, Ohio.

The Lorenna Foundry Co., recently organized at Bridgeport, Pa., have leased the Wm. Swan & Son foundry. Joseph C. Laird is president and A. Wilkinson, treasurer.

The Lindsay & Addison Co., of Los Angeles, and the Pomona Foundry & Machine Works, of Pomona, Cal., have consolidated under the name of the Lindsay & Addison Foundry & Machine Works. The new company will occupy the plant at Pomona, removing the machinery from Los Angeles. They will manufacture the Addison deep well double plunger pump and will in addition do general foundry and machine work.

The Sovereign Foundry & Mfg. Co., Lebanon, N. J., have been incorporated, with a capital stock of $125,000, for the purpose of taking over the foundry of the Eagle Foundry Co. and the machine shops of H. M. Sovereign, both built about two years ago. The new company will continue the manufacture of turbine water wheels, mill gearing, grain threshers and special machinery. The incorporators are Henry M. Sovereign and Edwin J. Sovereign, of Lebanon, and George E. Sovereign, of Pottersville, N. J.

The Wellman-Seaver-Morgan Engineering Co. will build a foundry of brick and steel construction at Cleveland, O. It will be built in three sections, the largest of which will be 73 feet in width and 300 feet in depth. The building will cost $34,000.

The Donaldsonville Iron Works, Donaldsonville, La., have been incorporated with a capital stock of $25,000, to succeed the Donaldsonville Foundry & Machine Works. The incorporators are Charles Mourin, Joseph Constantine, John W. Tucker, Henry McCall, J. N. Colomb, and C. R. Alleman.

The Perkins Machine Co. will erect a foundry at South Boston, Mass., 110x70 feet, for the purpose of making their own castings. The latest equipment will be installed and a specialty made of heavy castings.

The Fairbanks Machine Tool Co. of Springfield, Ohio, formerly operated by the Springfield Foundry Co., have been incorporated with a capital stock of $160,000, and have absorbed the business of the Springfield Foundry Co. and the United States Tool Holder Co., who have heretofore been operating independently. The officers are M. L. Milligan, president and general manager; N. H. Fairbanks, vice president and treasurer, and Pearl Young, secretary.

The business of E. R. Allen, Corning, N. Y., manufacturer of gray iron castings and special agricultural implements, has been incorporated under the name of the E. R. Allen Foundry Co., with a capital stock of $40,000. It is the intention of the company to install some new machinery and to enlarge the present plant. The directors are E. R. Allen, C. W. Allen, L. L. Flower, M. H. Fralic and H. E. Metcalf.

The Art Stove Co., Detroit, Mich., are building a new foundry, 182x184 feet, and a new engine and boiler house, 40x80 feet, in which will be installed two new boilers and a 500-horsepower engine, trebling the present power capacity.

The Southern Engine & Boiler Works, Jackson, Tenn., have increased their capital stock from $75,000 to $200,000. The company

now have in course of erection additions to their plant which, when completed, will give them about three times the capacity they have at present.

The Lumen Bearing Co., of Buffalo, will erect a new plant 70x190 feet.

William Sellers & Co., Philadelphia, will erect a new flask shop and foundry addition, 115x117 feet.

The Quaker Mfg. Co., Chicago Heights, Ill., have commenced work on their new plant. The foundry will be 70x150, one story; erecting shop and shipping building, 50x200, two stories; warehouse, 50x150, one story. There will be an engine and boiler house and pattern shop in addition. This company will manufacture hot air furnaces and combination hot air and hot water heaters.

Reports state that Joseph Wells, of the Bodie Foundry & Machine Shop, Bodie, Cal., will remove his plant to Richmond, Cal.

R. W. Kindel is adding a foundry to his machine shop at Weatherford, Texas.

The West Allis Malleable Iron & Chain Belt Co., Milwaukee, Wis., has perfected its organization by the election of the following officers: O. L. Hollister, president; C. S. Otjen, vice president; C. F. P. Pullen, treasurer, and W. H. Shenners, secretary. George F. von Sprecklesen has been appointed manager and George Glessner, superintendent. The company was recently incorporated with $100,000 capital, all paid in, and buildings costing $65,000 are already well under way. It is probable that the plant will be in operation in September.

The Astoria Brass Co., of Long Island City, N. Y., has been formed to conduct a brass foundry. The capital stock is $5,000.

Jacob Simon has purchased the brass foundry at Lansing, Mich., formerly operated by Hugh Lyons & Co., and expects to increase its capacity. J. J. Carey will have charge of operations.

Work has commenced on the foundation for the new plant of the Nevin Iron Works Co., at Plainfield, N. J., which is to be thoroughly modern in every particular. The main building, which will contain the machinery and wood working shops, will be 35x126 feet, one story in height, except the wood working department, which will be two stories. The foundry will be 35x91 feet.

The Yale & Towne Mfg. Co., of Stamford, Conn., will close their branch factory at Branford, Conn., and confine manufacturing to the former place.

The Sleeper Engine Co., Ltd., Montreal, Que., have been incorporated with $250,000 capital to manufacture engines, boilers and accessories. A. Watt, J. A. Jacobs, E. A. Mahon, F. H. Sleeper and A. R. Oughtred are the incorporators.

The Haish Wire & Implement Co., De Kalb, Ill., have been incorporated with a capital stock of $100,000 by Jacob Haish, C. H. Salisbury and B. S. White.

The LaCrosse Threshing Machine Co., LaCrosse, Wis., have been organized with a capital of $100,000 to manufacture threshing machinery. The incorporators are Joseph Borchert, R. C. Smith, C. C. McConville and R. L. Davis.

Angus Dow will build a foundry at Fargo, N. D.

Frank A. Japs has purchased the foundry and machine shop at Redwood Falls, Minn.

The Etna Foundry & Machine Works have been incorporated at Etna, Cal., with a capital of $20,000 by Joseph Stephens, A. H. Denny, L. A. Wilson, C. W. Nutting and Charles Kappler.

The Eagle Foundry & Machine Co., Allegheny, Pa., have completed plans for an extension of their plant. The company have increased their capital stock to $50,000, and will rebuild their present foundry, enlarging it to 140x77 feet.

The Wright & Finnie Foundry Co., of Youngstown, Ohio, have been incorporated with a capital of $20,000.

The Braddock Brass Foundry & Casting Co. have been organized at Braddock, Pa., and will build a foundry and machine shop at that place for the manufacture of iron and brass castings. The new concern include some former members of the Braddock Machine & Mfg. Co., and are capitalized at $200,000.

The Johnson City Foundry & Machine Co., Johnson City, Tenn., manufacturers of brass and iron castings and turbine wheels, have been incorporated as the Johnson City Foundry & Machine Works. The new company will continue the business along the same lines, but on a more extensive scale. The incorporators are J. Allen Smith, R. M. Rhea and Thomas J. Peed, of Knoxville, and Geo. W. and B. J. Setton, of Kansas City.

The Noble & Wood Machine Co., of Hoosick Falls, N. Y., have been incorporated, with a capital stock of $40,000. The directors are James A. Noble, H. P. Blackinton, Walter A. Wood, Jr., Frank L. Stevens and Delmer Runkle, of Hoosick Falls.

The Canadian Foundry Co., of Hamilton, Ont., have been incorporated with $150,000 capital and will take over the business and plant of the Hamilton Wheel & Foundry Co. R. J. Mercer has been appointed general manager.

The Davis Gasoline Engine Co., Waterloo, Ia., has increased its capital stock to $200,000 and has changed its name to the Cascaden Mfg. Co.

The Western Iron Works, of Baker City, Ore., have been incorporated with $100,000 capital by Charles F. Soderling, C. W. Hill and C. W. Ward.

The Wolverine Brass Works, Grand Rapids, Mich., are having plans prepared for a two-story foundry building to adjoin its present plant.

The J. G. Brill Co., of Philadelphia, have let the contract for the erection of a one-story brick foundry, 74x160 feet. This company manufactures cars and the cost of this addition to their plant is estimated at $10,000.

The Badger Brass Mfg. Co., Kenosha, Wis., will make additions to their plant which will practically double its capacity.

H. C. Doman & Co., proprietors of the Union Iron Works, Oshkosh, Wis., will erect a new plant for the manufacture of gas engines and general foundry work to cost $30,000. The machine shop will be 208x48 feet in size and the foundry and pattern shop will be located in a separate structure to be 208x40 feet.

The Peck-Williamson Heating & Ventilating Co., Cincinnati, O., have decided to erect a foundry at Wellston, O. A company will be organized under the name of the Peck-Williamson Foundry Co., with a capital of $100,000 to operate the plant. Plans for the buildings are being prepared.

The Union Foundry & Machine Co., Salt Lake City, Utah, have been incorporated with $15,000 capital. L. C. Sinclair is president; F. W. Brotzman, vice president; W. H. Fowler, treasurer, and F. F. Betts, secretary.

Fairbanks, Morse & Co., of Beloit, Wis., have begun the manufacture of steam pumps of all capacities. Four new buildings are now being constructed, including a foundry 132x92 feet, in which molding machines will be used exclusively; the pump shop proper, which will be 300x90 feet; a warehouse 150x80 feet, and a new power house. M. L. Jenkins will have charge of this department.

The Nickel Mfg. Co., of Morris, Ill., will enlarge their foundry.

Barry & Zecher, Lancaster, Pa., have acquired the old established iron foundry of R. C. McCully, which they will devote to the manufacture of light and heavy castings. Mr. Barry was formerly of Slaymaker, Barry & Co., lock manufacturers, and Mr. Zecher was formerly owner of a large pattern making business.

The Burns Foundry & Machine Co., recently incorporated, have secured the foundry and machine shop at 62-76 Rutledge street, Brooklyn, N. Y., which they have completely overhauled and now have in operation. The company manufacture gray iron castings, and do general machine work. The officers are: Robert Burns, Jr., formerly general superintendent for Jabez Burns & Sons, of New York City, president and general superintendent; Adam W. Smith, formerly foreman for the Edison General Electric Co., manager, and William F. King, secretary and treasurer.

The Car Wheel & Foundry Engineering Co. of Pittsburg, will build a plant in the Pittsburg district. An identified interest to be known as the Central Car Wheel & Casting Co., is also being organized. This company will also likely build a plant in the vicinity of Pittsburg.

The Columbia Iron & Steel Foundry Co., who now operate a plant in Pittsburg in the manufacture of steel castings of every description, have decided to build a larger plant where they can have better shipping facilities. The matter of a location is now being considered and the firm are open for propositions. Their present plans would require a main building 100x300 feet, besides buildings for power plant, etc. Until a definite location is decided upon the company will not take up details of the new plant, but will mature their plans as fast as possible.

The Nordyke & Marmon Co., of Indianapolis, Ind., will erect a foundry building 135x335 feet, of steel construction, to be equipped with every modern appliance.

John Drew has added a foundry to his machine shop at Chilson, Mich.

Thomas J. Creighton has started a brass foundry at Fall River, Mass.

Richmond Iron Works, Richmond, Va., have been incorporated with a capital stock of $100,000. The following officers have been elected: John Chamblin, president; George Cole Scott, vice president; Millard F. Cox, general manager; R. Massie Nolting, secretary and treasurer.

The Staten Island Brass & Gray Iron Foundry Co., of Elm Park, Richmond Borough, N. Y., have been organized with a capital of $6,000 by Harry Wilkes, W. H. Davidson and T. L. Fell.

The J. L. Mott Iron Works of New York City, will remove their plant to Trenton, N. J.

The Riverside Foundry & Machine Works have taken over the plant of the Stoner Iron Works, at Riverside, Cal. J. H. Harrington will be manager of the new concern and W. H. Morley, superintendent.

An addition is being built to the foundry of J. Alfred Clark, 35th street and Gray's Ferry Road, Philadelphia.

The Chambersburg Engineering Co., Chambersburg, Pa., is building an addition to its foundry, 60x150 feet, doubling its capacity.

The Sieben Mfg. Co., of Kansas City, Mo., have purchased the plants of the Sieben Mfg. & Supply Co. and Sieben & Connity. C. E. Davis will be president; Henry Sieben, vice president, and H. J. Davis, secretary and treasurer of the new company.

Plans have been prepared for a new brass foundry 100x150 feet to be built by P. A. Clum & Co., Rochester, N. Y.

The McKaig Foundry Co. have been incorporated at Detroit, Mich., with a capital of $5,000.

The Hornellsville Foundry Co. have incorporated at Hornellsville, N. Y., with a capital of $6,000. J. O. Adsit, H. A. Pratt and E. S. Brown are the organizers.

The St. Louis Car Wheel Co., St. Louis, Mo., have decided to erect a wheel foundry at Atlanta, Ga. The foundry building will be 230 feet long and 95 feet wide with wings for the engine and boiler house. The cost of the plant is estimated at $75,000.

W. A. Zellnecker will start a foundry at East St. Louis, Ill.

The Colonial Foundry Co. have been organized at East Norwalk, Conn., with a capital of $100,000 and will acquire the properties of the Norwalk Pattern & Mfg. Co. and L. J. Wing Mfg. Co., New York.

The Chattanooga Stove Co., Chattanooga, Tenn., have decided to increase the capacity of their foundry.

The contract for the erection of an addition to the Danville Foundry & Machine Co.'s plant at Danville, Ill., has been let. It will be two stories, 175x50 feet, and will connect the machine shop and foundry.

The Abbott-Stickney Foundry Co. will establish a foundry at Oelwein, Iowa. The new concern will handle the foundry work of the Chicago Great Western Ry.

The Catawissa Car & Foundry Co. are incorporated at Catawissa, Pa., with a capital of $10,000.

Plans have been prepared for the new plant of the Pneumatic Signal Co. to be erected at Rochester, N. Y., at a cost of $250,000. The dimensions of the buildings are as follows: Foundry, 60x140 feet; machine shop, 120x240 feet; pipe mill, 60x300 feet; carpenter shop, 60x150 feet; blacksmith shop, 60x120 feet; power house, 50x80 feet; paint shop, 60x60 feet; casting stores, 60x100 feet; storage building, 60x240 feet; offices, 60x60 feet.

Harry A. Bubb has purchased an interest in the foundry of Nelson L. Rundio at Williamsport, Pa., and the firm will be known as Rundio & Bubb.

The Pittsburgh Valve & Fittings Co., Pittsburg, Pa., have been incorporated with a capital of $200,000 by A. E. Anderson, Howard O. Turner and Guy D. Wallace.

The American Stove & Furnace Co., of Findlay, Ohio, have been incorporated with $25,000 capital stock with Frank Weber, president; S. F. Shafer, vice president and general manager; John Shafer, secretary, and William McGowan, treasurer.

The Allentown Hardware Mfg. Co., Allentown, Pa., have recently purchased the Allentown Brass Foundry, the Allentown Nickel & Brass Works and the Standard Electro Plating Works of that city. Besides manufacturing specialties they are also in a position to do both light and heavy brass, bronze and aluminum casting, as well as brass, copper and nickel plating and finishing.

Stohr & Freund, of Muscatine, Iowa, intend to erect a foundry at that place.

The Niagara Falls Machine & Foundry Co. have been organized at Niagara Falls, Ont., with a capital of $10,000 by O. D. Glasgow, H. Bender and H. A. Champaigne.

The Wm. E. Pratt Mfg. Co., of Chicago, are building a malleable iron plant at Joliet, Ill. The main foundry is 360 feet long and will give employment to 150 men. It is expected to have everything ready for operation early in July. Jas. W. Beaman, formerly with the Chicago Malleable Castings Co., West Pullman, Ill., and Chisholm & Moore Mfg. Co., Cleveland, O., will be superintendent of the new plant.

The Grafton Foundry & Machine Co. has been organized at Grafton, W. Va.

C. B. Hammett, of Tuscola, Ill., has under consideration the building of a foundry at that point.

Reports state that Thos. Devlin & Co., of Philadelphia, have purchased a site at Burlington, N. J., upon which a large foundry plant will be erected.

The Crompton & Knowles Loom Works, with plants at Worcester, Mass., and Providence, R. I., are said to contemplate the erection of a branch factory at Philadelphia.

The Great Lakes Engineering Works have been organized at Detroit, Mich., with a capital of $200,000 and the following officers: Antonio C. Pessano, president and general manager; H. W. Hoyt, vice president, and John R. Russel, secretary and treasurer. The plant of S. F. Hodge & Co. will be taken over and the same line of business continued under the new management.

Burnham, Williams & Co., the Baldwin Locomotive Works, Philadelphia, will build a foundry 380x80 feet in size at a cost of $135,000.

Deaths.

George W. Brown, vice-president and general manager of the Case Mfg. Co., Columbus, Ohio, died June 6, aged 48.

E. A. Delano, of Chicago, builder of the molding machine bearing his name, died in Denver, Colo., June 5, aged 56.

Edward Flather, of the Flather Foundry Co., Nashua, N. H., died recently, aged 63. He was a native of Bradford, England.

Walton C. Waterbury, formerly connected with Rogers, Brown & Merwin, of Chicago, and Forster, Waterbury & Co., of Franklin Park, Ill., and lately representing David Evans, Chicago manager of the Sloss-Sheffield Steel & Iron Co., died May 29, aged 44 years.

Andrew Wallace, for many years manager of the interests of John H. Bass, at Chicago, and one of the best known members of the Western iron trade, died at his residence in that city on May 26. Some years since the car wheel business and engine building department of Mr. Bass were incorporated under the name of the Fort Wayne Foundry & Machine Co., but Mr. Wallace was continued in charge of the Chicago works after the reorganization, holding his position until his death. Mr. Wallace was a native of Scotland, had reached the age of 77, and was one of the oldest members of St. Andrew's Society.

Lyman Hubbell, proprietor of the Fillmore Ave. Foundry & Iron Works, Buffalo, N. Y., died on May 17, in his fifty-sixth year. A few years ago he bought out the old Ketchum Foundry on Fillmore avenue, which he developed into a prosperous and flourishing business.

L. C. Jewett, whose numerous contributions to the columns of THE FOUNDRY have been of more than usual interest to our readers, died recently at Taunton, Mass. Mr. Jewett was born in Smithland, Ky., Jan. 13, 18[illegible] and had

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worked as journeyman and foreman in many parts of the country. About ten years ago he became interested in a foundry in Boston, from which he retired four years ago, owing to failing health.

David Christie, who for many years conducted a foundry at Owen Sound, Ont., died June 14, aged 82.

Norman S. Byram, president of the Byram Foundry Co., Indianapolis, Ind., died June 16, aged 71.

James Huston Watt, president of the Watt Mining Car Wheel Co., of Barnesville, Ohio, died recently at Philadelphia.

Joseph B. Renshaw, manager of the Foundry Supply Co., Hartford, Conn., died recently in that city. He was born at Dodge Hill, Heaton,

Norris, England, July 13, 1822, and came to this country in 1847. Several inventions relating to skimming gates and dowel pins were patented by him as well as a number of appliances of interest to other trades.

Fires.

An explosion of natural gas in the core room of H. B. Milmine & Co., Toledo, Ohio, caused about $1,200 damage to building and contents.

The plant of the Sunbury Iron Works, Sunbury, Pa., was recently damaged $20,000 by fire.

The plant of the Vulcan Iron Works, Toledo, O., suffered a loss of $35,000 by fire June 5. The machine and erecting shops were completely wrecked while the foundry was damaged by water.

The plant of the Enterprise Stove Co., Vincennes, Ind., has been destroyed by fire entailing a loss of $200,000.

The brass foundry of the P. & F. Corbin Co., New Britain, Conn., was recently destroyed by fire entailing a loss of $50,000.

The Nichols & Shepard Co., Battle Creek, Mich., suffered a $100,000 loss by fire at their plant May 27.

Guylee & Deyo's foundry, at Poughkeepsie, N. Y., burned June 15. Loss $5,000 covered by insurance.

The building being erected for the Johnson Foundry & Machine Co., at Battle Creek, Mich., was blown down during a heavy storm June 15.

The foundry at Laurel, Miss., operated by the Kingston Lumber Co., burned June 10. Temporary quarters will be secured until a new building can be completed.

A. R. Robinson's foundry at Alexander City, Ala., was destroyed by fire June 14 together with the greater part of that city.

The Phœnix Iron Works, of Portland, Ore., burned June 21, entailing a loss of $80,000.

E. Dole & Son's foundry, recently started at Oak Hill, Ohio, burned June 11.

The Singer Mfg. Co., of Montreal, P. Q., suffered a loss of $15,000 on patterns and building in a fire at their foundry June 17.

The Robinson Machine Co., of Monongahela, Pa., sustained a loss of $45,000 in the burning of their foundry May 29.

The Diamond Drill & Machine Co., Birdsboro, Pa., lost their pattern shop and foundry through a fire June 19. The loss is estimated at $30,000.

The car building plant at Hegewisch, Ill., lately acquired by the Western Steel Car & Foundry Co., was destroyed by fire June 4, resulting in a loss approximating $100,000.

A wind storm demolished the foundry of the Gustafson Bros. Mfg. Co., at Sequachee, Tenn., June 19.

A Casting Breaker.

Many small foundries seem to have poor facilities for breaking up old castings, says a writer in *The American Machinist*, and the

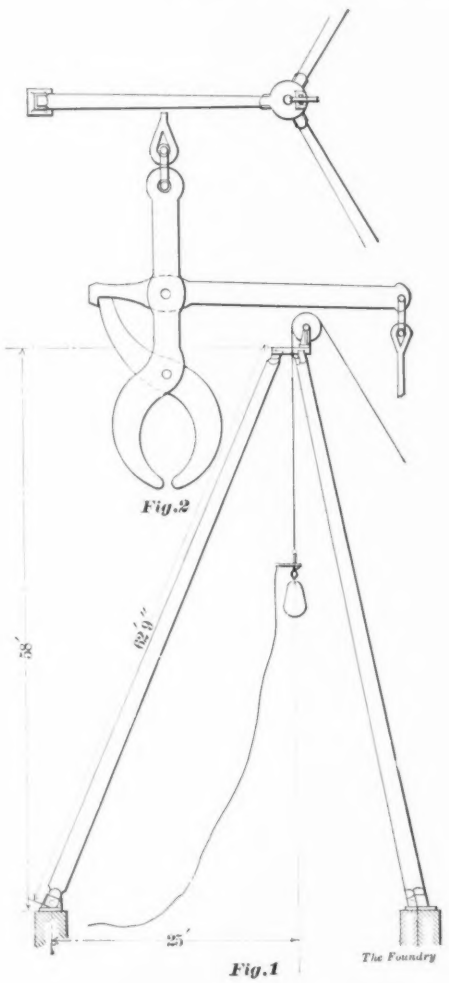


Fig.2

Fig.1

A CASTING BREAKER.

arrangement herewith illustrated, which is in use at steel works and large foundries, where most cast iron scrap has to be broken, may be of general interest. Fig. 1 shows what is ordinarily called a "drop," and it seems to be the best thing that is used for the purpose.

As generally made, it consists of a tripod with wooden legs set in cast-iron feet, while the tops of the legs are connected together with a single casting, which in turn supports the sheave wheel bracket.

A 6,000 pound egg-shaped ball is hoisted by means of a rope over the sheave wheel and wound up by an electric hoist engine. The ball is raised as high as is necessary and then released and allowed to fall upon the casting to be broken.

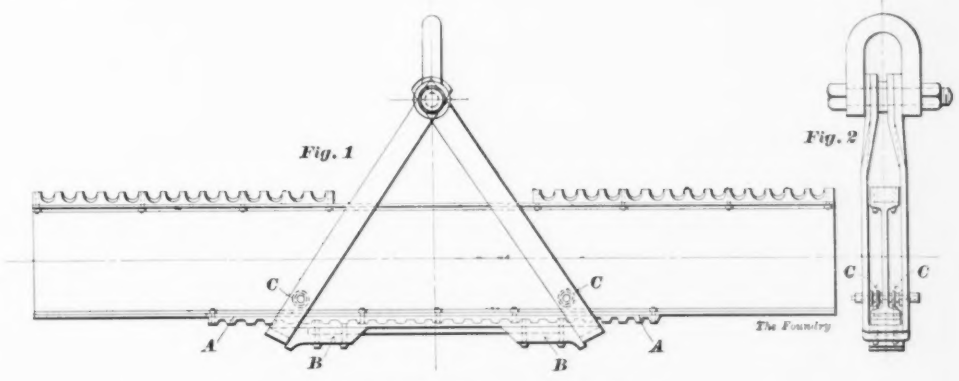
The ball is connected to the rope by means of a latch hook, as shown in Fig. 2, and is cut loose by unlatching the hook by means of the rope that hangs from the lever arm of the latch.

The size of the "drop" shown herewith is about what is generally used at a steel mill for breaking scrap, and of course would be much larger than would be required at a small foundry, but the same thing on a smaller scale may be used very effectively. A small "drop" might be made so that the ball could be raised by hand and yet do very good service. A better and more effective one would easily be manipulated by a small crab. Such a "drop" might carry a ball weighing 500 pounds, which, raised to 20 feet, would answer the purpose very satisfactorily for a medium-sized foundry.

An Adjustable Lifting Beam.

For many classes of work where rapidity in handling flasks is desired, a well designed lifting beam and properly constructed trunnions or handles on the flasks go a long way towards avoiding delay. The attached illustration shows an adjustable lifting beam designed by R. J. Milligan, foreman of the U. S. Cast Iron Pipe & Foundry Co.'s plant at Addyston, Ohio. Much of the work turned out there is of a heavy character, especially so some of the special fittings made in loam molds. As every molder knows more or less adjustment becomes necessary to have the molds balance, and it is here that an easily adjusted lifting beam comes in handy.

The beam shown herewith combines lightness with strength, as the principal part of it is formed of a steel I beam of suitable size. The attachments by which it is made adjustable are of cast iron on the top of the beam while the rack A on its lower side is a steel plate, made the same width as the flange of the beam and riveted thereto. A similar plate is riveted to the shoes, B, whose ends are wedge shaped so as to give the straps, held as shown in Fig 2, an even bearing surface. C C are rollers designed to facilitate the movement of the straps in either direction, which shifts the center to the desired point without rearranging either shackles or chains.



AN ADJUSTABLE LIFTING BEAM.

The Effect of Temperature in the Cupola upon the Quality of Castings.

There are two foundries in this vicinity in which certain conditions have excited my curiosity and set me to thinking if chemistry is employed in the selection of iron and fuel for special castings, is it a panacea under all conditions which can occur in foundry practice? At one foundry which we will call No. 1 they employ a capable chemist who has served this firm for the past three years, selecting both iron and fuel. The owner of this shop informed me that their methods of handling their mixtures were particularly satisfactory, bringing them desired results.

The castings here made are all molded in

green sand and of a very light character. Ninety per cent of the metal has to be handled in ladles holding from forty to fifty pounds and nothing but the hottest kind of iron can be used. These castings are finished by expensive tools which would be materially injured by any great variation in the character of the casting. In order to have uniform iron it becomes necessary to have a very high and even temperature in the cupola.

The other foundry, which we will call No. 2, makes castings of an entirely different character, comprising machinery of the heaviest class, a great number of the castings weighing from one to forty tons each, being molded in green, dry sand and loam, as the particular job may require. More or less machine work has to be done on these.

The same chemist is employed at both shops, he having control of the selection of iron and fuel for both foundries and the cupolas in each shop are charged with the same care. While everything at No. 1 foundry runs along smoothly and the castings give satisfaction as to density and softness, at the No. 2 foundry where chunky castings are the rule they are having a circus of a time, to use a workshop expression. More time is consumed in finishing castings at the latter shop although the work is of a very chunky class. Tools are broken or damaged, and the castings do everything but give satisfaction. My opinion is that in No. 1 foundry the chemist and his deductions come out all right for the simple reason that a high and consequently even temperature is maintained in the cupola. To tell the truth it is easier to keep a high temperature even than a low one. At No. 2 foundry there seem to be ghosts and birds of evil omen holding high carnival, while big, ungainly skulls from bunged-up ladles bedeck the yard. All of these things offer mute eloquence that a mania to save fuel has laid hold upon this shop. Undoubtedly the management argues that as the castings are chunky affairs the metal need not be melted as hot as for light castings. The motive being to save fuel in the foundry at all costs, no matter what happens in the machine shop. I recently knew of a foundry proprietor who, after spending much time selecting a mixture from blast furnace analyses, instructed his foreman to cut down the fuel as the work was heavy and did not require very hot iron to run it, although the castings were machined nearly all over.

At a foundry where chilled wheels were made a specialty, the superintendent of the foundries—they had three shops—while sitting in his office during the heat, would often inform the assistant foreman that the chill upon the test plugs would be light, medium, etc., and all of this without visiting the foundry. The assistant was mystified as to how a person could tell the condition of the fracture of a test plug without seeing it, when the same mixture was charged into the cupola day after day, yet this man could tell within a sixteenth of an inch the depth of the chill in a certain test bar, and if of abrupt termination at the line of demarkation between the chilled and unchilled portion of the casting.

Upon one occasion the assistant asked his superior if he would explain to him how he could do these things without going near the shop. The superintendent said "Seat yourself in this chair and watch the top of the wheel cupola when it is in blast. You will notice certain variations of color and peculiar characteristics of the escaping gases and smoke. These are sure indications of how the cupola is working, whether melting is being done evenly, or more on one side of the cupola than the other. It also shows if the bed is too low or at a proper height and if the cupola is being kept at a high or low temperature. Each and all of these conditions have their effect and as the cupola works good, bad or indifferent, so will the test pieces we are making be affected. This notwithstanding the fact that the same mixture of iron is charged from one end of the heat to the other."

Time and better acquaintance with the foundry has proved to me that this superintendent's deductions are true in every particular. Does this not argue that chemical changes unknown or uncontrollable will and do take place when the temperature of the cupola varies? The results obtained by the two foundries referred to show that such is the case. The question is, will the analysis of iron and fuel guarantee a product uniform in character at the cupola spout, unless an even temperature is maintained during the period of melting and this is possible only with a high temperature? There is nothing of a fogy about me as I am a firm believer in the value of chemistry in foundry practice, not only in iron and fuel, but also in the application of same to sand, clay, facings, etc., but when anyone starts to talking about selecting iron by chemical analysis and melting it at a ratio of one to ten, twelve and even higher, as some do, this makes me weary at once. How about blast furnaces? It would offer a beautiful chance to some foundry proprietors to loaf around one of these awhile and note how the temperature of the furnace affects the product.

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